Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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OSCAR L. CHAPMAN, Secretary

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ALBERT M. DAY, Director

Commercial Fisheries Abstracts

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In addition to the regular abstracts, there is included a bibliography of references of secondary importance (without abstracts). These may be cut off on the lines designated and pasted on standard 3 x 5-inch cards for filing.

Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

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1 Fish by species
2 Fresh fish
3 Preserved fish
4 Oils
5 Vitamins
6 Fishery by-products
7 Analytical Methods
8 Composition
9 Miscellaneous

Issued with the approval of the Bureau of the Budget, December 29, 1950

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QUARTERLY OUTLOOK FOR MARKETING FISHERY PRODUCTS, JANUARY - MARCH 1953

Russell, Ralph
Fishery Leaflet 336o, United States Department of the Interior, Fish and Wildlife Service, Washington 25, D. C. (January, 1953)

This report is the sixteenth in a series of analyses of economic situations and their anticipated effect upon the marketing of fishery products. The publication forecasts the marketing prospects of more than 50 individual fishery products for the first three months of 1953. Some 50 charts illustrate various factors important in the general situation or in the marketing of specific commodities.

The over-all situation is summarized under the heading "The Outlook at a Glance" at the beginning of the report. A high rate of business activity and employment is forecast, with large consumer income and heavy consumer expenditure. Active food markets with very heavy supplies are anticipated in the report, but markets for edible fishery products are expected to be unsettled owing to heavy supplies and competition from other foods. Among the byproducts, fish meal is expected to find a steady market, but fish oils will sell on a dull market and markets for fish-liver oils will be weak.

The summary states that the first quarter of 1953 will be the season of lowest production in the fisheries, and exports of fishery products will be below those of the same quarter of 1952. Unusually heavy cold-storage stocks and a high rate of imports will combine with current production to create unusually heavy supplies of edible fishery products considering the season. Cold-storage holdings will decline sharply as the quarter progresses. Among the canned fishery products, only tuna and Maine sardines are expected to be in heavy supply.

(over)

 ABSTRACTER: Ralph Russell

8.64

THE DISTRIBUTION OF VITAMIN B_{12}-ACTIVE SUBSTANCES IN SOME MARINE INVERTEBRATES OF BRITISH COLUMBIA

Maxwell, B. E. (Pacific Fisheries Experimental Station, Vancouver, B. C.)
Journal of the Fisheries Research Board of Canada IX, No. 3, 164-168 (September, 1952)

Specimens were collected alive, air frozen at about -25°C. within 24 hours, and stored at -25°C. in the dark for not over three months until they were assayed. When possible, at least ten individuals of any species were used as a sample. Only the soft parts of hard-shelled animals were used. For all other samples the entire animal was homogenized. Vitamin B_{12} was extracted with Mylase P at pH 5.0 and assayed microbiologically.

TABLE I. Content of vitamin B_{12}-active substances in marine invertebrates

Phylum	Class and species	Raw tissue pH	Moisture (%)	B_{12}-active substances, mμg. per gram Wet basis	Dry basis
	Chaetopoda				
	Aphrodite negligens Moore	6.50	84.9	21	140
Annelida	* Aphrodite negligens Moore	6.50	92.6	4	54
	Eudistylia vancouveri (Kinberg)	6.20	86.3	190	1,400
	Crustacea				
Arthropoda	Pagurus hirsutiusculus (Dana)	8.30	66.3	96	290
	Hemigrapsus oregonensis (Dana)	8.45	64.5	49	140
	Placophora				
	Mopalia muscosa (Gould)	6.50	86.9	260	1,900
	Gastropoda				
Mollusca	Pleurophyllidia californica (Cooper)	7.10	90.2	90	920
	An unidentified Nudibranch	7.10	94.8	77	1,500

(over)

 ABSTRACTER: Neva L. Karrick

8.64

STUDIES ON THE VITAMIN B_{12} OF AQUATIC ANIMALS. I. THE VITAMIN B_{12} CONTENT OF FISHES (1)

Yamase, Masaaki (Tokai Regional Fisheries Research Laboratory)
Bulletin of the Japanese Society of Scientific Fisheries 17, No. 12, 389-392 (July 25, 1952)

The vitamin B_{12} content of a number of fishes was determined by microbiological assay using Euglena gracilis as the test organism. The results are summarized in Table 4, below. Either of two methods was used in preparing the material for assay; namely, direct water extraction or digestion with pancreatin followed by water extraction.

Table 4 Vitamin B_{12} content in the tissues of fishes. (γ in 100 g. fresh matter)

Kind of fish	Sample no.	Body wt. g	Exp. no.	B_{12} content: Flesh	Liver	Stomach & Intestines	Pyloric caeca	Spleen	Kidney	Heart	Egg	Dark flesh
サンマ *Cololabis saira*	(2)	96	V	4.6								
	(3)	112	VI		33							
	(4)	113	VII	1.2	21					2.3		
	(5)	100	VIII	1.5 (1.8)	18 (24)							
スケトウダラ *Katsuwonus vagans*	(1)	3000	I	0.6	4.5		1.5	1.5	1.4			
	(2)	2250	II	0.3	2.5	2.2	1.1	0.8				
	(3)	1120	IV	0.5	4.2	1.0	1.0	1.1				
ソーダカツオ *Auxis thazard*		450	VI	0.4	4.4	1.7	0.7	1.1	0.6	1.3		4.4
マアジ *Trachurus japonicus*	(1)	39,45,56	II	0.8	20	0.8	0.9	0.4		2.6		
	(2)	84	VII	0.1 (0.2)	12 (21)							

(over)

 Reprinted in part

8.50

THE EXTRACTIVES IN FISH MUSCLE

Anonymous
Report of the Food Investigation Board (Great Britain) For The Year 1950, 28-29 (1952)

The extractives in fish muscle consist of a heterogenous group of compounds that include carbohydrates and related intermediate products of metabolism and nitrogenous substances such as creatine, urea, trimethylamine oxide and various amino acids. Because they are of low molecular weight the extractives are the first to be attacked by micro-organisms. How long a fish remains palatable, therefore, depends upon the kind and quantity of the resulting decomposition products.

Trimethylamine oxide and its products of decomposition, dimethylamine, formaldehyde, and trimethylamine, have particular significance in the spoilage of fresh, salted, or dried marine fish and in the "ripening" of canned fish and corrosion of tin containers. In commodities such as whalemeat and in meats from animals fed on fish meal, trimethylamine oxide is reported to be responsible for the development of "fishy" or "off" flavors.

In a systematic study of some of the nitrogenous substances found in fresh and deteriorating fish muscle, several hundred individual fish were sampled and analyzed. The species examined were caught in the North Sea off Aberdeen and in the Arctic waters of the White Sea and around Bear Island. In these fish the nitrogenous extractives were found to account for 10 to 40 percent of the total nitrogen in the muscle. In cod, haddock, whiting, and other gadoids the values for nitrogenous extractives ranged from 9 to 14 percent; in herring, from 14 to 18 percent; and in the elasmobranchs or skates and dogfish, from 34 to 38 percent. Trimethylamine oxide in cod and skate was found to account for 20 and 6 percent, respectively, of the total non-protein nitrogen in the muscle.

(over)

 ABSTRACTER: Martin Heerdt

QUARTERLY OUTLOOK REPORT

VITAMIN B_{12} CONTENT OF JAPANESE FISH

VITAMIN B_{12} IN MARINE INVERTEBRATES

FISH MUSCLE EXTRACTIVES

8.64

Table 4 Vitamin B_{12} content in the tissues of fishes.
(γ in 100 g. fresh matter)

Kind of fish	Sample no.	Body wt. g	Exp. no.	B_{12} content: Flesh	Liver	Stomach & intestines	Pyloric coeca	Spleen	Kidney	Heart	Egg	Dark flesh
サバ *Scomber japonicus*		375	I	0.4	6.4		0.5					
イヤガレイ *Kareius bicoloratus*	(1)	225	VII	0.1	4.5						9.2	
ブリ *Seriola quinqueradiata*		4100	IV	(0.3)	(127)							28
メバチ *Parathunnus sibi*			X		27 (38)							
ボラ *Mugil cephalus*	(2)	131	V	0.6	106							
	(3)	260	VI	0.06	23 (44)							
マダイ *Pagrosomus major*	(1)	225	I	0.0(0.1)	9.3 (18)							
	(2)	107	II	0.4 (0.8)	7.2							
ハゼ *Acanthogobius flavimanus*	(1)	31	V	0.9	4.1							
	(2)	8	V	1.1	18							
アオメエソ *Chlorophthalmus albatrossis*			V	1.1		2.7(viscera)						
イトヨリ *Eulthyopterosoma virgatum*		336	VI	0.02	2.7							
ウナギ *Anguilla japonica*		86	I	0.6	7.8 (23)							
コイ *Cyprius carpio*		700	II	0.2	6.0							
フナ *Carassius auratus*			VI	0.05	0.2							
メジマサメ *Carcharinus japonicus*		3400	I	none	0.5							
スズトウダイ *Therapra chalcogramma*	(2)	1900	I	0.06(0.2)	0.3 (1.8)							

Values in parentheses indicate that the material was digested with pancreatin followed by water extraction in contrast to direct water extraction.

8.50

Apart from the differences due to species, the trimethylamine oxide content of fish muscle was found to be affected by factors such as environment, size and age. In cod, haddock, and whiting, the average trimethylamine oxide content increased with an increase in the size of the fish in spite of wide variations within the same size group. Different muscles within the same fish may also vary in oxide content. The dark, lateral line flesh of herring and tuna, for example, contains about one-half as much oxide as the normal skeletal muscle.

Surprisingly, the average trimethylamine oxide content of haddock and cod from Arctic waters was about 2 times the oxide content of similar fish from the North Sea. While the reason for the difference is obscure, the temperature of the environment may be the responsible factor. This has been suggested by Konold and Jakobsen in their attempt to account for the difference that they found between the oxide content of herring and brisling. Arctic fishing waters average about 4° C. (39°F.) while the North Sea fishing waters average about 6° C. (43° F.) from January to March, and 13° C. (55.5° F.) during August and September. In haddock of a given size group taken off Aberdeen at monthly intervals during the past year, the lowest trimethylamine contents were recorded during the months of August, September, and October, to further substantiate the theory of the Norwegian workers.

Differences between species were also found in regard to the other nitrogenous constituents of the protein-free muscle extract. Cod, haddock, and whiting were found to be very similar with respect to nitrogenous constituents and probably contained anserine and carnosine along with glycine, β-alanine and traces of alanine. In contrast, the nitrogenous constituents from herring contained glycine and alanine but little if any β-alanine, carnosine, or anserine.

9.2

The Outlook Report forecasts a strong market for mackerel and croaker and an active market for shad, catfish, and bullheads. A firm or fairly firm market is predicted for yellow perch, oysters, lake trout, smelt, lobsters, sea trout, canned oysters, mild-cured salmon, red snapper, salt herring, canned herring, and canned mackerel. A steady or fairly steady market is anticipated for fresh and frozen salmon, bluefish, butterfish, sablefish or black cod, sea bass, canned salmon, sardines, and canned tuna, as well as clams, fresh and canned crab meat, spiny lobster tails, shrimp and canned shrimp, scallops, buffalofish, yellow pike, whitefish, and lake herring. Unsettled markets are forecast for flounder and sole, halibut, whiting, chubs, swordfish, scup, and mullet, while markets are expected to be dull for haddock, ocean perch, carp, and rockfishes. Weak markets are predicted for cod, pollock, sheepshead, and suckers.

8.64

TABLE I. (Continued)

Phylum	Class and species	Raw tissue pH	Moisture (%)	B_{12}-active substances, mμg. per gram: Wet basis	Dry basis
Mollusca	*Acmaea scutum patina*	7.50	81.0	190	990
	Thais lima (Martyn)	8.50	80.8	550	2,900
	Pelecypoda				
	Schizothaerus nuttallii (Conrad)	6.80	85.7	250	1,800
	Paphia staminea Conrad	6.80	83.4	310	1,900
	Mytilus edulis Linnaeus	6.60	86.9	120	930
	Pecten caurinus (Gould)	6.40	87.1	240	1,900
	Ostrea gigas Thunberg	6.30	82.7	100	570
	Ostrea gigas Thunberg (diff. locality)	6.20	82.6	130	740
	Cephalopoda				
	Rossia pacifica Berry	6.65	81.3	130	680
Echinoderm-ata	Asteroidea				
	Mediaster aequalis Stimpson	7.50	72.9	110	410
	Pisaster ochraceus (Brandt)	7.20	70.9	180	600
	Ophiuroidea				
	Ophiura sarsii (Lutken)	8.40	46.9	150	280
	Echinoidea				
	Strongylocentrotus drobachiensis (Muller)	6.30	89.8	100	1,000
	Lovenia cordiformis A. Agassiz	6.60	77.3	30	130
	Holothuroidea				
	Stichopus californicus (Stimpson)	6.50	93.1	17	250
	** *Cucumaria miniata* (Brandt)	6.75	85.8	12	84
	** *Cucumaria lubrica* Clark				
	Molpadia arenicola (Stimpson)	6.10	91.9	20	250

*The skin or outer covering of this species was not included in the assay.
**These two species were assayed together.

6.134 THE LYSOSUNDS METHOD FOR FULL UTILIZATION OF THE RAW MATERIAL FOR WHOLE MEAL

Tornes, Eilif
Meldinger fra SSF No. 2, 35-40 (March, 1952) (Abstract reprinted from World Fisheries Abstracts (FAO) 3. No. 3, 41 (May-June, 1952)

A herring reduction plant at Trondelag, Norway has developed and used for the past 5 years a method for the full utilization of the raw material by the production of "whole meal" which includes all the water-soluble constituents. Water-soluble proteins vary from 18 to 20% for fresh winter herring to as high as 40% for summer herring. The already existing direct heat dryers are used to condense the stickwater, usually in 2 steps (see over), and the additional equipment required is mainly of the type used at present in reduction plants. As more water must be evaporated, the capacity of the plant is reduced unless the drying capacity is increased considerably. The amount of stickwater is kept to a minimum by using indirect cooking, indirect heating of press liquid and by using stickwater (instead of water) for separators and sludge screens. This undiluted stickwater has a content of 8 to 13% solids.

In Figure 1, the stickwater is mixed with the press cake and some half-dried material in a mixing apparatus, and semi-dried in the pre-dryer. A part of the semi-dry material is recirculated and used to absorb stickwater in the mixing apparatus while the rest is dried to meal in the second stage dryer. The quantity and moisture content (20 to 25%) of the recirculated material is adjusted so as to use to the best advantage the capacity of each of the 2 dryers and allow relatively low temperature drying in the second stage to avoid destruction of the vitamins.

In Figure 2, all the semi-dried material is mixed with the stickwater and press cake, and this mixture (of 45 to 55% moisture content) is then divided between the 2 dryers.

(over)

 ABSTRACTER: H. Kristjonsson

6.3 ALGAE (CHLORELLA PYRENOIDOSA) AS A SOURCE OF NUTRIENTS FOR THE CHICK

Combs, G. F. (Poultry Department, University of Maryland, College Park)
Science 116, No. 3017, 453 (October 24, 1952)

Uniform groups of 16-day-old New Hampshire chicks of both sexes were used to test the feeding value of dried Chlorella. The birds were housed in electrically heated battery brooders with raised wire floors during the 4-week experimental feeding period. A basal diet considered to be suboptimal in riboflavin, vitamin B_{12}, and vitamin A for the rapid early growth of chicks was fed.

When Chlorella was given to the chicks, it was substituted in the diet for an equal weight of soybean oil meal. The Chlorella fed had been grown under pilot plant conditions and vacuum dried at 70°F. It was reasonably similar in nutritive value to samples grown elsewhere under laboratory conditions, assays of which are presented in Tables 1 and 2 (this card, over). Chlorella compares favorably with soybean oil meal protein except for its low level of methionine, and it is relatively high in vitamins as compared with other feedstuffs.

The results obtained by supplementing the basal diet are presented in Table 3 (this card, over). When 10 percent Chlorella was included in the basal diet in place of an equal amount of soybean oil meal, a very marked increase in growth and improvement in feed efficiency resulted. This improvement was attributed primarily to the high riboflavin and carotene content of the Chlorella, although important quantities of several other B-complex vitamins were also supplied by the supplement. The addition of 0.1 percent dl-methionine to the diet containing Chlorella resulted in a further improvement, whereas the

(over)

 ABSTRACTER: Martin Heerdt

6.52 THE FEEDING OF MARINE FISHES TO MINK

Watt, Phyllis R. (Oregon State College Experimental Fur Farm, Corvallis)
National Fur News 24, No. 6, 12-13, 25 (July, 1952)

For many years western fur farmers have raised mink very satisfactorily on rations containing high amounts of fish. In fact, fur farming was established and has become an important industry in the Western states because of a constant supply of marine fishes. However, mink that are fed high fish diets present many problems unfamiliar to fur farmers who feed large amounts of horsemeat.

Problems of particular importance include: the relationship of cereals and fish in the diet; the palatability of certain species of fish; the food value of various species; the ratio of red meats to fish in the total diet; and problems concerning spoilage, handling, and storage of fish.

Unlike many of the east coast marine fishes, the western marine fishes do not ordinarily contain an anti-thiamine factor. One species, Columbia River smelt, does contain it, but the truly marine types of fish do not show this factor.

In 1950 with the aim of relieving the emphasis upon fish species extensively filleted for human food, 217 mink were fed diets containing three seldom-utilized marine fishes. Pacific hake, arrow-toothed flounder, and black rockfish were used in the rations ranging from 25 to 75 percent of the total diet with varying results. Pacific hake, at all levels used in these tests, was unsatisfactory, since it neither produced an acceptable pelt nor promoted adequate growth. Arrow-toothed flounder, at the 50 percent level, produced exceptional growth, but the animals on this ration had a definite undesirable brownish cast to their pelts. Black rockfish, on the other hand, did not produce satisfactory growth, but a very dark pelt color was noted -- especially at the 50 percent level.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

6.23 PREPARATION OF COD LIVER OIL BY FREEZING

Thorbjarnarson, Thordur and Jonsson, Hordur
Report on Technological Research Concerning the Icelandic Fish Industry VI, 15-26 (1944-1946)

The article describes experiments designed to evaluate a method for rendering cod livers. By this method the livers were first frozen, then thawed and disintegrated and finally centrifuged at a temperature substantially below the coagulation temperature of the liver protein. When fat livers treated in this way were centrifuged in an ordinary laboratory centrifuge, about 95% of the liver oil could be skimmed off directly. Separation experiments of this type are shown in Table I. When centrifuged in a Sharples Laboratory Super Centrifuge without dilution with water, an average amount of 96.6% of the liver oil was recovered. Separation experiments of this type are shown in Table II. In Table III it is shown how the oil lost in the Sharples experiments is divided between 1) the effluent from the centrifuge, 2) the solids collected in the bowl and 3) the residue flowing from the bowl on stopping the centrifuge. In Table IV the vitamin A content of the oil recovered in four of the Sharples experiments is compared with the vitamin A content of the oil left in the waste materials. Fig. I shows how the ffa in frozen cod livers increases during storage at -18°C. Results of vitamin A estimations on the oil and the amounts of oil recovered on centrifuging are also recorded. It was found that this rendering technique worked best on fat livers, especially those containing in excess of 60% of oil.

 English summary

MANUFACTURE OF WHOLE MEAL

MARINE FISHES AS FOOD FOR MINK

ALGAE IN CHICK NUTRITION

PREPARATION OF COD LIVER OIL BY FREEZING

6.52

Consequently, in 1951, 56 mink were fed a diet containing 50 percent arrow-toothed flounder, and on August 25, one-half of the group was changed to a diet containing 50 percent black rockfish. The mink continued on these diets through pelting and were compared in growth and pelt value to a standard diet considered to be adequate.

Of all experimental groups in 1952, the group of mink receiving the diet containing 50 percent arrow-toothed flounder until August 25 and 50 percent black rockfish through pelting, rated highest in pelt value and had the highest gain in weight.

In addition to the arrow-toothed flounder and the black rockfish in the above diets for 1951 and 1952, there were included: red rockfish 17 percent, tripe 15 percent, horsemeat 7 percent, liver 4 percent, and cereal 7 percent.

The majority of the experiments have been conducted in an attempt to eliminate or replace the 8 to 20 percent horsemeat Northwest fur farmers have included in total diets of mink. Most of the diets contained about 80 percent fish -- mixed sole carcasses, red rockfish carcasses and whole arrow-toothed flounder -- and 3 1/2 percent condemned beef liver. The cereal percentage ranged from 7 to 13.5 and included wheat germ 2-10 percent, brewers' yeast 1 1/2 percent, alfalfa 1 1/2 percent, Cerl-meal 2 percent, and bone meal 1 percent. Mink receiving the control ration containing up to 13.5 percent cereal were benefited in varying degrees by certain supplements. An amino acid, dl-methionine, added at a level of 0.05 percent of dry matter, gave an increase in growth and pelt value of considerable importance, but when the methionine was doubled the effects were detrimental.

Cooking the fish in a diet similar to the high-fish control ration increased the growth rate to an acceptable level and produced a pelt which, on the average, was $2 more valuable. However, the fur farmer, when feeding a cooked ration, is faced with extra labor in feeding into dishes or pans that will hold the very watery feed and that must be cleaned out each day. If this extra expense in labor could be overcome, the advantages of feeding a cooked fish ration on a ranch basis could be realized.

6.23 (Cross Reference: 1.5)

6.134

Reasons for using two-step drying are that semi-dried material absorbs the stickwater faster than completely dried meal with a hardened surface. Further, the rapid evaporation from the wet particles in the pre-dryer permits a relatively very high capacity by increasing draft and firing rate (as furnace and fans permit), without danger of overheating the meal. Thermal efficiency is also better in the pre-dryer as the exhaust vapor is almost saturated.

It is claimed that: (1) mixing and drying is trouble free, provided sufficient quantities are recirculated; (2) the "whole meal" does not cake in storage; (3) feeding tests show the whole meal to be equal to ordinary meal plus the proportionate quantity of vacuum condensed solubles; (4) the method works well on various raw materials; (5) fat percentage of whole meal is lower than that of ordinary meal; (6) blood water from the bins can also be processed this way; (7) the fuel oil consumption is 28 to 35 kg. oil per 100 kg. whole meal, depending on the raw material; (8) the fuel oil cost for condensing the stickwater averages around 10% of the gain in value of the product. The Lysosund method is covered by Norwegian Patent Number 75,942.

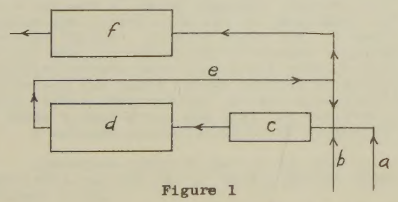

Figure 1

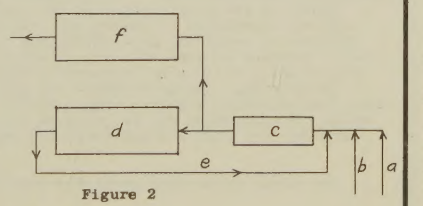

Figure 2

a-Press cake b-Stickwater c-Mixing apparatus
d-Dryer - I e-Semi-dried material f-Dryer - II

6.3

addition of vitamin A, B_{12}, riboflavin, niacin, pantothenic acid, and choline chloride did not further increase the average weight at 4 weeks. Chicks that received the same diet as group 4 but with soybean oil meal in place of Chlorella were slightly heavier. The chicks in group 6 that received adequate levels of all nutrients as well as antibiotic in the complete broiler mash made the greatest improvement in growth.

Chicks that received 10 percent dried Chlorella exhibited an impacted beak condition. This mechanical impediment interfered with feed consumption and, reportedly, resulted in a slightly lower total weight at 4 weeks of age. The impacted beaks are believed to have been due to the hygroscopic nature of the dried Chlorella; however, by the use of suitable drying methods this problem probably can be eliminated.

TABLE 1
AMINO ACID ASSAY OF DRIED CHLORELLA

Nutrient	Pilot plant* sample (%)	Laboratory† sample (%)
Crude protein	44.0	40.0
Arginine	2.06	2.39
Histidine	0.82	0.65
Isoleucine	1.75	1.69
Leucine	3.79	1.99
Lysine	2.06	2.43
Methionine	0.36	0.57
Phenylalanine	1.81	2.14
Threonine	2.12	1.91
Tryptophane	0.80	0.41
Valine	2.47	2.67
Glycine	—	2.20

* Microbiological assay by Food Research Laboratories, Inc., reported to Carnegie Institution of Washington by Kenneth Morgan-ridge, chief chemist, March 27, 1952.
† Mean values of two samples grown by Spoehr and Milner (14); microbiological assay by Merck & Co., 1949.

TABLE 2
VITAMIN ASSAY OF DRIED CHLORELLA

Vitamin	Pilot plant* sample	Laboratory† sample
Carotene, mg/lb	—	218.0
Thiamin, mg/lb	11.0	4.5
Riboflavin, mg/lb	26.2	16.3
Niacin, mg/lb	54.0	109.0
Pyridoxine, mg/lb	—	10.4
Pantothenic acid, mg/lb	3.6	9.1
Choline, mg/lb	—	1370.0
Biotin, µg/lb	—	67.0
Vitamin B_{12}, µg/lb	45.0	10.0
Lipoic acid, acetate u/mg	1.5	—

* Microbiological assay by J. J. Mayernik and David Hood Bu, of Merck & Co., Jan. 1952.
† Grown by Stanford Research Institute in continuous dilution culture apparatus; assay by Curtis and Tompkins, San Francisco. Data taken from unpublished report from Stanford Research Institute to the Research Corporation of New York, March 22, 1950, by permission.

TABLE 3
EFFECT OF DRIED CHLORELLA ON BODY WEIGHT AND FEED EFFICIENCY OF CHICKS

Group No.	Treatment	Av wt at 4 wks (g)	G feed required g g⁻¹
1	Basal ration	135 (13)	3.1
2	As 1 + 10% chlorella	262 (16)	2.4
3	As 1 + 10% chlorella + 0.1% DL-methionine	298 (16)	2.3
4	As 1 + 10% chlorella + 0.1% DL-methionine + vitamin mixture*	292 (16)	2.3
5	As 1 + 0.1% DL-methionine + vitamin mixture†	316 (16)	2.2
6	Complete broiler mash	342 (16)	2.2

* Numbers in parentheses refer to surviving chicks.
† Vitamin mixture supplied the following per lb of diet: 6 µg vitamin B_{12}, 2 mg riboflavin, 10 mg niacin, 2 mg calcium pantothenate, 150 mg choline chloride, and 2500 IU vitamin A.

2.01 ANTIBIOTICS IN MINK FEED

Tarr, H. L. A.
National Fur News 24, No. 7, 12-13, 28 (August, 1952)

According to H. G. Luther of Chas. Pfizer and Co., the growth and general health of mink may be improved significantly by adding terramycin to their diet. The author has shown that certain antibiotics in small quantities can retard the growth of microorganisms in flesh foods. These findings suggest that the addition of antibiotics to the diets of fur-bearing animals might inhibit food spoilage as well as stimulate animal growth.

Only a few antibiotics have proven effective as inhibitors of food spoilage organisms. Experiments were conducted at temperatures as widely separated as 32°F. and 70°F. with both fish and beef flesh obtained under conditions of minimal bacterial contamination. The antibiotics were added either directly to the minced flesh or by dipping the steaks in aqueous solutions of the antibiotic. Spoilage was followed by a direct bacterial count. The results obtained are tabulated (this card, over).

It is obvious that aureomycin was the most effective antibiotic used; terramycin was next in effectiveness, and chloromycetin was considerably less effective than either of the foregoing antibiotics. The effect of the antibiotics was foreshortened at the higher temperatures by more rapid spoilage. Aureomycin in concentrations as low as 1/2 part per million was markedly effective; however, higher concentrations (10-20 p.p.m.) would be desirable in flesh foods for animal feeding rations. Rimocidin had a very effective deterrent action on the growth of yeasts but no appreciable action against bacteria. It would seem desirable, therefore, to include an antibiotic that hinders yeast and mold growth. In many cases aureomycin and terramycin seemed to be responsible for an almost total inhibition of bacterial growth, yet they did not prevent the growth of yeasts.

Further experimental work will be needed before the present findings can be used.

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2.114 ABSORPTION REFRIGERATION IN THE FISHING INDUSTRY

Gunnarsson, G. K. (Atlantic Fisheries Experimental Station, Halifax, N. S.)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 54, 7-11 (September, 1952)

In a compression refrigeration system the ammonia is conveyed from the low-to the high-pressure side by mechanical means, whereas in the absorption system a different method is employed. To obtain the reduced pressure essential to the operation of the absorption system, the evaporator is connected to a vessel called an absorber which usually is located in the engine room. The weak solution of ammonia and water that is circulated through the absorber dissolves ammonia very readily. Consequently it is able to absorb the ammonia vapor from the evaporator, place it in solution, and reduce the low-side pressure. In the absorber the weak solution becomes so enriched in ammonia that upon leaving this vessel it is a relatively strong solution.

From the absorber the ammonia solution is pumped into a second vessel or generator, which is located on the high-pressure side of the cycle. When heat is supplied to the generator, usually in the form of low-pressure steam, the ammonia vapor is driven off by the rise in temperature and condensed in the customary manner. The weak solution remaining in the generator then travels through a pressure-reducing valve and reenters the absorber where the cycle is repeated. The only moving part required by the absorption system is a relatively small electric motor or steam-driven pump.

The capacity of an absorption system can be increased with an increase in steam pressure or a decrease in the cooling water inlet temperature. The efficiency or performance factor of an absorption system is expressed as the ratio of heat extracted from the

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2.116 UNDERWATER SOUND FISH-LOCATING EXPERIMENTS

Anonymous
U. S. Department of the Interior, Fish and Wildlife Service, Fishery Products Report No. 207, Seattle, Washington (October 22, 1952)

First phases in a research project to investigate possibilities of locating schools of fish by listening for them on underwater sound detecting devices were carried out this summer in the Gulf of Maine and adjacent waters. This project was carried out under a contract between the U. S. Fish & Wildlife Service and the Old Dominion Research and Development Corp. of Erica, Va. The work was directed by the Branch of Commercial Fisheries' electronics scientist stationed at the University of Miami Marine Laboratory. The Corporation furnished technical personnel, the vessel, the crew, and designed and built some of the equipment used. The President of Old Dominion acted as master of the Bowdoin in addition to his professional duties.

The work was done aboard the 88-foot auxiliary schooner, Bowdoin, a vessel well-known for her many arctic exploratory voyages. The Bowdoin was chartered from her owner, Captain Donald B. MacMillan of Provincetown, Massachusetts, and outfitted with special electronic equipment for listening to, amplifying and recording underwater sounds in a frequency range from 10 cycles per second to 100,000 cycles per second. Some echo ranging and echo sounding equipment was also carried.

During the months of August and September, numerous cruises were made from Gloucester, Boston, and other New England ports to locate schools of commercially valuable fish, such as tuna and mackerel. When such schools were found, the hydrophones were put over the side and the sounds picked up in the water were amplified and recorded on magnetic tape

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2.19 IMPROVEMENT OF QUALITY OF ICED FISH

Anonymous
Report of the Food Investigation Board (Great Britain) For The Year 1951, 6-7 (1952)

Some 600 cod from distant waters were examined by the established taste panel technique. These examinations provided 3000 scores for the odor of the raw and the odor and flavor of the cooked fish. Trimethylamine values (mg. N per 100 ml. expressed juice) from the raw fish were also obtained. The subjective and objective data when correlated showed a rather wide range of sensory scores for any one trimethylamine value.

A delay in the icing of fish aboard the trawler is not improbable when fishing is good. This delay when extended to 18-20 hours at 5° to 7°C. resulted in a two-day average reduction in the storage quality of eviscerated and washed fish. To estimate the effect of the worst possible time and temperature conditions likely to be encountered in the distant fishery, a further experiment was conducted. Eviscerated and washed fish were exposed for 22 hours to a temperature of 5°C., iced for 8 days, and then allowed to rise in temperature during the 9th to 14th day from 0° to 5°C. Storage life was reduced from 18 to 13 days as a result of the foregoing treatment.

Experiments with North Sea iced fish in an atmosphere containing 30 to 40 percent carbon dioxide indicate that 5 to 6 days in ice is the maximum permissible interval prior to the introduction of the gas when the total storage period is 21 days.

ANTIBIOTICS AS SPOILAGE INHIBITORS

ABSORPTION REFRIGERATION SYSTEM

LOCATING FISH BY UNDERWATER SOUND

QUALITY OF ICED FISH

2.114 (Cross Reference: 3.231)

evaporator to the heat put into the generator and energy put into the aqua pump. For the experimental work a small absorption unit of new design was obtained. Only general conclusions regarding capacities and heat consumption are presented.

In this study the performance factor ranged from 0.35 to 0.45. This factor was highest at low cooling water temperatures and decreased slowly with falling evaporator temperatures to indicate that heat consumption per ton of refrigeration produced is affected only slightly by the evaporator temperature. In practice, a performance factor of 0.40 to 0.45 could be expected for this and similar types of absorption systems. In other words, approximately 27,000 to 30,000 B.t.u. per standard ton of refrigeration per hour would be required to operate the system.

The experimental evidence collected shows that absorption systems have many advantages in low-temperature applications. Four of the advantages are summarized below.

1. The system uses steam or other primary heat. Process steam, waste steam, or exhaust gases can be used.

2. With the exception of the small motor or steam turbine-driven aqua pump, no moving parts are involved.

3. By merely increasing the steam pressure to the generator, the system will operate at reduced suction pressure with very little decrease in refrigeration capacity as compared with a compression system.

4. The system will function at reduced load with very little loss of efficiency simply by regulating the amount of steam to the generator.

2.01

PRESERVATION OF BRILL FLESH STORED AT 38° F.

Antibiotic[1]	Bacterial count after days[2] 7	11
None	9.8	1500
Aureomycin (25)	0.023	0.60
Aureomycin (10)	0.023	0.10
Terramycin (25)	0.01	0.10
Terramycin (10)	0.023	0.80
Chloromycetin (50)	0.04	300
Chloromycetin (25)	0.01	390
Chloromycetin (10)	0.22	2900

PRESERVATION OF LINGCOD FLESH STORED AT 38° F.

Antibiotic[1]	Bacterial count after days[2] 6	10	13
None	1300		
Aureomycin (2)	1.3	1.2B 31 Y	4.3B 64 Y
Aureomycin (2) plus rimocidin (10)	0.92	1.0	8.0B 0.5Y
Aureomycin (2) plus rimocidin (2)	0.38	4.0Y 0.4B	5.0B 48.0Y
Rimocidin (10)	*		
Rimocidin (50)	*		

*Putrid Y-Yeasts B-Bacteria

PRESERVATION OF HALIBUT MUSCLE STORED AT 65-70° F.

Antibiotic[1]	Bacterial count after days[2] 1	2
None	10	4900
Aureomycin (10)	0.01	8 Y
Aureomycin (10) plus rimocidin (10)	0.026	4.9
Terramycin (10)	0.13	12
Chloromycetin (10)	0.15	360

PRESERVATION OF HALIBUT FLESH STORED AT 32° F.

Antibiotic[1]	Bacterial count after days[2] 6	10	18
None	38	1000	*
None	44	950	*
Aureomycin (50)	0.01	0.08	1300 (yeasts)
Aureomycin (25)	0.01	0.35	1500 (yeasts)
Chloromycetin (50)	0.10	79	*
Chloromycetin (25)	0.24	230	*

PRESERVATION OF SHOULDER BEEF AT DIFFERENT TEMPERATURES

Antibiotic[1]	Bacterial count[2] Days at 32° F. 8	23	Days at 65-70° F. 1	2
None	12	20,000	130	2,700
Aureomycin (1)	0.1	1,500	0.01	300
Aureomycin (0.5)	0.26	3,200	4.0	850
Aureomycin (1) plus rimocidin (10)	1.2	440	2.9	8.3
Aureomycin (1) plus rimocidin (5)	0.58	490	0.52	200
Terramycin (5)	0.19	850	0.9	140
Terramycin (2)	0.95	6,000	3.6	300
Terramycin (2) plus rimocidin (10)	14	20,000	8.0	3,100
Terramycin (2) plus rimocidin (5)	17	20,000	4.3	290

PRESERVATION OF SHANK BEEF AT DIFFERENT TEMPERATURES

Antibiotic[1]	Bacterial count[2] Days at 40° F. 7	16	Days at 32° F. 23
None	0.66	50,000	2,900
Aureomycin (10)	0.01	26Y	5.8Y
Aureomycin (5)	0.01	58Y	4.6Y
Aureomycin (2)	0.01	37Y	6.6Y
Aureomycin (1)	0.01	150	4.0Y
Terramycin (10)	0.01	95Y	9.0Y
Terramycin (5)	0.01	100	3.7Y
Terramycin (2)	0.01		720

1--As parts per million of the flesh food
2--In millions per gram

2.116

recorders installed on the vessel. It is well known that certain marine animals make characteristic identifying noises. If this is found to be true of commercial species of fish, it may offer an efficient means of locating them.

A number of recordings were made near schools of fish, primarily bluefin tuna and mackerel. Unfortunately only a few schools of tuna were sighted due to the fact that apparently this species did not show up in New England waters this year in as large numbers as have been reported during previous years. Recordings were made at night in Massachusetts Bay on schools of mackerel which were found by the phosphorescent glow which they produced in the water.

The recordings will be analyzed in the laboratory to determine if they contain sounds made by the fish. If the analysis shows that there are characteristic noises associated with a school of tuna or mackerel, additional work will be undertaken to develop special devices for use by commercial fishermen that will be particularly sensitive to these sounds. It would be a simple matter to arrange the device so that a signal light would flash in the pilot house whenever the fishing boat passes within range of a school, either at or beneath the surface, thereby reducing considerably the time spent in looking for fish.

6.139 THE EFFECT OF HEAT ON THE BIOLOGICAL VALUE OF PROTEINS

Morgan, Agnes Fay
Journal of Home Economics 44, No. 10, 761-764 (December, 1952)

The fact that even comparatively mild heating between 60° and 80°C. produces measurable changes, or denaturation, in proteins is well known. Physical, chemical, and immunological properties are measurably changed in the course of the denaturation of protein molecules. It seems reasonable then that the nutritive value might be correspondingly altered, particularly if the heating is excessive or prolonged.

In 1915 McCollum and Davis noted deterioration in dried skim milk products after prolonged heating. Soon afterwards the poor growth value of "flame dried" fish meal was recorded. Later the confusing fact was noted that raw soybeans were ineffective as the source of protein for young animals but that the cooked beans were adequate.

Although the nutritive value of the proteins of milk, eggs, meat, fish and cereals appeared to be affected adversely by heat in proportion to temperature and duration of heating, the nutritive value of bean proteins appeared to be improved by moderate heating. Mild heating such as that involved in boiling, short, mild autoclaving, or dry heating 30 minutes at 150°C. improved the growth value of the bean proteins; but drastic autoclaving at 120°C. or above, or prolonged roasting, reversed the condition, and deterioration of biological value resulted. In other foods the damaging effect apparently occurs in both mild and severe heating processes without the preliminary improvement.

When food proteins other than those of beans are heated, the chief amino acid affected is lysine. Most but not all of the nutritive value of some of these heated

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COMMERCIAL FISHERIES ABSTRACTS VOL. VI NO. 2 PAGE 7
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Kathryn L. Osterhaug

5.41 MICROBIOLOGICAL SYNTHESIS OF VITAMIN B_{12} BY PROPIONIC ACID BACTERIA

Leviton, Abraham and Hargrove, Robert E. (Bureau of Dairy Industry, Agricultural Research Administration, U. S. Department of Agriculture, Washington, D. C.)
Industrial and Engineering Chemistry 44, No. 11, 2651-2655 (November, 1952)

Some conditions that have given excellent yields of vitamin B_{12}-active compounds by cultures of propionic acid bacteria are described. A number of factors connected with regularization of the yield were investigated and are reported.

Vitamin B_{12} activity was determined by a modification of the U. S. P. microbiological method. Volatile acids were determined by the method of Friedemann and Brook. From a careful determination of the partition of volatile acids between ethyl ether and water, the ratio between propionic and acetic acid was calculated. Lactic acid was determined in the ether extract of a sample that had been clarified with zinc hydroxide. Propionibacterium freudenreichii (ATCC 6207) was used in the experiments.

Vitamin B_{12} yields were determined under various conditions of anaerobiosis and aerobiosis. Results indicated that strong aeration was not only inhibitory but would lead to the destruction of preformed vitamin-active substances. Further experiments indicated that strict anaerobiosis was not essential for high yields and that yields could be increased by agitation. On a larger scale it was shown that under moderate conditions of agitation anaerobic conditions help neither rates nor yields.

The authors found that fermentation of 2% sodium lactate broth may be achieved in a batch process in 40 hours or less with a 4% inoculum. The duration of the lag phase is

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COMMERCIAL FISHERIES ABSTRACTS VOL. VI NO. 2 PAGE 7
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Neva L. Karrick

6.190 METHIONINE, VITAMIN B_{12} AND FISH MEAL AS SUPPLEMENTS IN AN ALL-VEGETABLE CHICK STARTING RATION

Ringrose, R. C. and Potter, L. M. (University of New Hampshire, Durham, N. H.)
Poultry Science 31, No. 5, 932 (September, 1952)

In an experiment replicated five times with New Hampshire male chicks reared in batteries, methionine, vitamin B_{12} and fish meal were used as supplements in a starting ration in which the main source of protein was soybean oil meal. All possible combinations of the three supplements were studied when the level of methionine was set at 0.1 percent, vitamin B_{12} 7.5 micrograms per pound and fish meal four percent. The experiment was of eight weeks duration.

Vitamin B_{12} when added to the ration in any combination failed to significantly improve growth or feed efficiency. Methionine when added to the basal ration improved growth but not significantly. There was little effect on feed efficiency. When added to the basal ration supplemented with vitamin B_{12} and fish meal, methionine failed to improve growth but improved feed efficiency to a point closely approaching statistical significance. Whenever fish meal replaced an equivalent quantity of protein from soybean oil meal in any combination in the ration, growth and feed efficiency were significantly improved. With one exception the differences obtained with fish meal were highly significant.

COMMERCIAL FISHERIES ABSTRACTS VOL. VI NO. 2 PAGE 7
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. Reprinted in whole

4.61 THE USE OF MONOSODIUM GLUTAMATE IN FROZEN FOODS

Norton, Karl B.; Tressler, Donald K.; and Farkas, Lillian D.
Food Technology 6, No. 11, 405-411 (November, 1952)

The frozen products selected for study were fish, fresh and cured meat, poultry, and vegetables. In every instance samples were taken from production lines during regular commercial operations. These samples represent as nearly as possible commercial practices and procedures, including freezing and storage at both 0°F. and 10°F. (-17.8° and -12.2°C.). Periodic examinations were made visually before cooking and both visually and organoleptically after cooking throughout the time that the samples were in storage.

Only the seafood series will be reported here. Fresh shrimp were peeled, washed, and packed without cooking, in 12-ounce packages. After freezing, half of the samples were glazed by brushing the frozen blocks with 25 ml. of an aqueous solution containing 0.5 g. of monosodium glutamate. The remaining half of the samples were glazed with 25 ml. of plain water. All samples were packed into moisture-proof cellophane bags inside of cartons and placed in storage.

Silver salmon steaks weighing approximately 8 ounces each were dusted with 0.35 g. of monosodium glutamate and then wrapped in cellophane. The control samples were wrapped in cellophane without any treatment.

Mackerel fillets, 3 to a package, were dusted with 0.2 g. of monosodium glutamate, then wrapped in cellophane and frozen. The controls were wrapped in cellophane without any treatment.

Haddock fillets weighing about 14 ounces each, were dusted with 0.6 g. of monosodium glutamate, and wrapped in cellophane. The untreated controls were simply wrapped in cellophane.

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COMMERCIAL FISHERIES ABSTRACTS VOL. VI NO. 2 PAGE 7
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Martin Heerdt

4.61

Ocean perch (rosefish) fillets weighing 8 ounces per package were dusted with 0.34 g. of monosodium glutamate prior to packaging. Again, the controls were packaged without any treatment.

For examination, the block of frozen shrimp was placed in a pan containing 2 cups of boiling water and boiled for 15 minutes. All other samples of fish were thawed at room temperature and broiled in an electric oven until ready to eat. Table 1, below, shows the test panel opinion of the paired samples that were stored at 0°F. Samples stored at 10°F. were similar in quality upon examination to samples stored at 0°F. except that the changes occurred earlier in the storage period.

TABLE 1
Comparison of controls with glutamate treated seafood samples held in frozen storage at 0° F. (—17.8° C.)

Months storage time	Control	Glutamate treated
	Shrimp	
1	Excellent somewhat flat taste	Excellent full rounded flavor
5	Very Good but toughened sl.	Excellent sl. more tender than control
7	Very Good about same as five months	Very Good color sl. brighter than control
14	Fair dry and flat but still edible	Good sweeter, better flavor than control
	Salmon	
1	Excellent color and flavor	Excellent color and full flavor
3	Fair color fading	Excellent color and full flavor
10	Poor dry, flavorless, very poor color	Very Good still bright color aged flavor
12	Poor practically inedible, very poor flavor	Fair still bright color fair flavor
	Mackerel, Haddock, Rosefish	
1	Very Good	Very Good all preferred to controls
3	Good	Good all preferred to controls
5	Fair to Good old flavor	Good all preferred to controls
9	Poor Mackerel—rancid Haddock—strong off flavor Rosefish—rancid off flavor	Poor Mackerel—still edible Haddock—better than control Rosefish—still good

6.139 (Cross Reference: 6.195)

proteins can be restored by the addition of small amounts of lysine to the diet. Some improvement may also be obtained by the addition of histidine, at least in the case of casein. Other amino acids shown to be involved in the change in certain proteins are tryptophane, arginine and cystine.

The amount of the loss of growth value produced by heating, as seen in rat feeding tests, varies from a barely significant decrease to complete failure of growth. The conditions that govern the severity of the damage appear to be chiefly (a) temperature, (b) duration of heating, (c) presence of carbohydrate, (d) presence of moisture, and (e) nature of the protein.

The nature of the reaction that brings about the loss has been fairly well established as, in most cases, the formation of a carbohydrate-amino group linkage. This reaction is known as the Maillard or browning reaction.

As the amino-sugar reaction progresses, the in vitro stages recognized have been (1) development of fluorescence, (2) darkening, (3) loss of solubility, and (4) degradation to soluble but non-protein compounds. Biological experiments have shown mounting loss of nutritive value, both for growth and for maintenance, from the second stage onward.

Autoclaved or canned beef, particularly when ground, has reduced biological value. Severely autoclaved pork has been found to have drastically reduced digestibility and heat-treated liver and kidney have shown similar losses. Ordinary household methods of cooking meat, such as stewing, pan broiling, or roasting, appear to have little effect on the value of the protein. Pressure cooking even for brief periods, however, may cause sizable losses.

The author states that little attention has been given to the effect of heat upon fish proteins since the early reports of the inferiority of flame dried fish meal. One study, however, has indicated darkening of white fish or herring canned in tomato sauce and also of dehydrated fish in storage. This was ascribed to the Maillard reaction. No biological tests were given. Further study of this problem is needed in view of the volume of canned fish produced and the possibility that improvement or processing might be accomplished.

5.41 (Cross Reference: 0.5)

dependent on the size of the inoculum and on lactate concentration. Distillers solubles contain inhibitory substances; thus the quality of yeast extract may have been a rate-limiting factor in experiments in which large concentrations of yeast extract were used as the source of nitrogen.

Results of rat assays and microbiological assays agreed with respect to the activities averaged over a 34-day period in sterilized fermentation liquor and its clear beer, but the rat assay gave higher value for the unsterilized liquor. Eighty percent of the activity was due to vitamin B_{12b} and 20 percent to the cyanocobaltammine compound.

In another experiment the lactic acid concentration was increased in increments to much higher values. The lag period was comparatively short and practically as much volatile acids and cellular substances were produced with a corresponding consumption of lactic acid in the first 20-hour period as in the second. Only 40 hours were required for the fermentation of not less than 2% lactic acid. The development of vitamin B_{12} activity followed only roughly the development of protoplasm, and only during the period of most intensive growth was the increase linear. Not less than 1.25 mg. per liter of active substance was produced in 40 hours and 20 g. per liter of lactic acid was utilized. After another 10 g. of lactic acid was added an additional 0.45 mg. per liter was produced. More lactic acid brought about a proportionate increase in volatile acids but not in cell substance, and a slight drop in vitamin activity.

The activity developed in the fermentations resided in the cells. The active material could be stripped from the cells to yield a concentrate containing 12 mg. per gram. This was largely vitamin B_{12b}.

In a comparison between glucose and lactic acid in the substrate, glucose appeared to be more efficient as a source of energy and of material in the activities of the cell associated with vitamin B_{12} production, but more activity per unit weight of cells was obtained in the lactic acid fermentation.

The results of a symbiotic experiment using L. casei (ATCC 7469) and P. freudenreichii gave a final yield of 4.3 mg. of vitamin B_{12} activity, corresponding approximately to 3 g. per liter of dry cells. This yield was obtained after 312 hours. However, it is possible that this time could be reduced.

3.4 SMOKED AND BARBECUED SHRIMP

Fieger, E. A.; Lewis, Harvye; and Crown, R. M. (Louisiana Agricultural Experiment Station, Louisiana State University, Baton Rouge)
Southern Fisherman 12, No. 10, 31, 87 (October, 1952)

Studies were conducted in an effort to develop improved methods for the smoking of shrimp.

Because of the size of shrimp the problem of dehydration during smoking is an important one. The most successful method of preventing moisture loss was found to be the partial cooking of peeled shrimp by boiling, followed by a short period in dense, cool smoke.

When the shrimp were coated with vegetable oil, objectionable flavors were absorbed from the smoke. Unpeeled shrimp required longer smoking for flavor development so that the protective effect of the shells was of no advantage. The partial cooking of shrimp in boiling water aids moisture retention by shortening smoking time and also has the important effect of sterilizing the surface of the meats. This prevents the accelerated growth of bacteria during the smoking period. When the temperature of the room is kept below 100° F. in order to produce a dense smoke, conditions are ideal for the growth of most spoilage organisms.

In preparing the product, headless shrimp of medium size were peeled, deveined and boiled in brine for two minutes. In order to simulate plant conditions, a steam-jacketed kettle containing ten gallons of water in which was dissolved 12 pounds of salt was used for cooking. With such a large volume of boiling brine it was possible to add ten pounds

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 ABSTRACTER: Roy C. Stevens

3.249 FREEZING AND COLD STORAGE

Anonymous
Report of the Food Investigation Board (Great Britain) For The Year 1951, 7-8 (1952)

In unfrozen cod, the amount of fluid that may be pressed from the flesh increases with the length of storage in ice. During the first three days the quantity of expressible fluid increases rapidly; thereafter, it increases more slowly. Freezing and thawing causes an immediate increase in the amount of expressible fluid. This increase is greater the fresher the fish. The sum of the effect of storage in ice and freezing, however, is more or less constant; consequently, the amounts of fluid derived from newly frozen fish of differing initial freshness do not differ appreciably (Figure I, below).

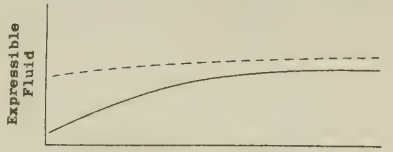

Figure I

------ frozen
_____ unfrozen

The temperature of storage has a marked effect on the amount of expressible fluid in the thawed fish. Storage at -10°C. (14°F.) resulted in a rapid increase in expressible

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 ABSTRACTER: Martin Heerdt

3.33 OYSTER CANNING IN THE MARITIMES

Anonymous
Trade News 5, No. 4, 8 (October, 1952)

Eastern oysters (Ostrea virginica) have been canned in the Maritime Provinces of Canada only for the last four years.

On arrival at the plant the oysters are washed in a squirrel-type rotary washer or are merely sprayed with a hose.

The cleaned oysters are steamed in steam boxes or retorts for fifteen to twenty minutes at 240°F. or ten to fifteen minutes at 250°F. These times do not include the "come up" time of six to eight minutes or the "blow down" time of one minute. The steaming time must be long enough to open the shells and to allow the meats to be removed without tearing the adductor muscle.

Oyster meats must be removed from the shell while hot in order to avoid tearing the muscle. Shucking is accomplished with a dull-edged knife having a small thick blade. One hundred pounds of oyster shell stock yields only about six to seven pounds of meats.

After thorough washing to remove mud, grit, and shell particles, the meats are drained for a few minutes on wire-mesh screens before packing. Most oysters in the Maritimes are packed in half-pound flat cans although a few are packed in five-ounce talls. Since no further shrinkage takes place during processing, only three ounces of meats need be added to a can to yield a drained weight of three ounces after processing. "C" enamel cans are used for packing oysters.

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 ABSTRACTER: Roy C. Stevens

3.249 ON THE FROZEN "OTOSHIMI" (CRUSHED FISH MEAT)

Yoshimura, Katsuzi; Kubo, Shuichiro; Soma, Toyozo; and Murakami, Kunio
Bulletin of the Japanese Society of Scientific Fisheries 17, No. 2, 74 (1951)

Fishes are frozen usually in such forms as "round", "pressed" and "Otoshimi" and "fillet". We tried to freeze fishes in a new form, "Otoshimi" (crushed fish meat), which is suitable for the transportation and the raw material of foods. This crushed meat was prepared as follows. Fish fillet was washed with water and minced by chopper. After freezing and glazing, this fish meat cake was wrapped with parchment paper and stored at low temperature.

Comparing with fish fillet, the denaturation of proteins in the frozen crushed meat was studied, which was stored at 14°F. The results obtained may be summarized as follows.
1) The jelly strength of "Kamaboko" (a sort of boiled fishpaste) made from the frozen "Otoshimi" decreased according to the storage period and the decreasing ratio was larger in "Otoshimi" than in fish fillet. The remarkable decrease of the jelly strength was observed during the first 20 days.
2) During the cold storage, moisture and protein decreased and free ammonia increased. These changes were more remarkable in "Otoshimi" than in fish fillet.
3) Myosin, myogen and myotelin decreased and the decrease of myosin was also remarkable in "Otoshimi" during the first 20 days.
4) The isoelectric points of myosin, myogen and myotelin moved to the acid side. Among the aminoacids contained in the proteins above mentioned, diamino acids decreased and monoaminoacids increased.
5) In the first 10 days, the decrease of diamino acids in myosin and the increase of monoaminoacids in myogen were remarkable both in "Otoshimi" and fish fillet.

 English summary

3.33 (Cross Reference: 1.81)

Hot brine is added to the cans immediately before they are sealed. A head-space of about one-quarter inch is left. The vacuum obtained in the cans depends mainly upon the temperature of the can contents at the time of sealing.

The flavor of canned oysters may be improved by the addition of small amounts of monosodium glutamate. Best results have been obtained by adding enough MSG to give a final concentration of 0.2 percent in the canned product.

After sealing, the cans are washed in hot water to remove any adhering particles of meat, etc. One-half pound flat cans are processed for thirty-five minutes at 240°F. The cans are cooled immediately after processing by immersion in cold water or by spraying with cold water.

3.4 (Cross Reference: 1.85)

of shrimp with only momentary drop in temperature.

The length of time in boiling brine is said to be critical. If undercooked, the shrimp will taste raw after smoking; if they are overcooked in the brine the smoked product will be dry and tough. The length of cooking time in the brine was found to vary from one to four minutes depending on the size of the shrimp. Loss of translucency was considered an indication of sufficient boiling.

Spread in a single layer on a wire-mesh rack the partially cooked shrimp were placed in the smoking room immediately. Smouldering hickory sawdust provided a dense smoke and the temperature was held at 90°F. The length of the smoking period was determined by tasting samples at intervals. A smoking period of one hour was generally sufficient.

A barbecued shrimp with a highly spiced flavor and only a hint of smoking was obtained by preparing the shrimp as for the smoked product, then dipping them in a barbecue sauce made of tomatoes, oil, spices, and other ingredients and smoking at a room temperature of 160°F. There was very little dense smoke at this temperature. By tasting the shrimp at intervals the shrimp were found to be sufficiently cooked after one hour. The product may be served with or without added barbecue sauce.

Storage studies are now under way. Smoked shrimp have been stored successfully for four weeks at 40°F.; longer storage at this temperature is not recommended since molds may develop on the shrimp. Packed in enamel-lined cans, smoked shrimp were considered excellent in quality after frozen storage of three months. Barbecued shrimp with sauce were less tender after the same period of frozen storage.

3.249 (Cross References: 2.19, 1.5, 1.2, 3.4)

fluid during the first three months of observation. Cod that was held for 18 hours in ice lost 5 percent of its weight as fluid in the fresh state, 9.6 percent immediately after freezing and thawing, 20 percent after 3 months' storage at -10°C. (14°F.), and 24 percent after 9 months at -10°C. The corresponding values for cod that had been iced for 11 days were 8.8 percent in the fresh state and 10.4, 27.5, and 32.1 percent, respectively, in the frozen state. Storage at -30°C. (-22°F.) resulted in only a slight increase in the quantity of expressible fluid obtained with the passage of time. The staler fish, however, did yield somewhat more fluid than the fresher ones, even at -30°C. Fish stored at -20°C. (-4°F.) yielded a quantity of fluid intermediate between the quantity yielded by those stored at -10° and -30°C. Fish stored at -20°C., likewise, were more subject to the release of fluid during the first three months of storage than in subsequent storage. When analyzed, the concentration of protein and non-protein solids in the fluid expressed from the various fish held in frozen storage was found to increase with an increase in the period of storage.

Kippers, made from fresh herring, cured to a 15 percent loss in weight, then frozen and stored, were inferior in all respects to kippers made from herring stored in the frozen state and kippered thereafter. Little difference was found, however, between the degree of rancidity that developed in kippers frozen in compact blocks and those frozen in wooden boxes. The degree of curing is presently believed to have an over-riding influence on the amount of rancidity that develops in kippers in frozen storage. This view, if confirmed, will necessitate specifying the degree to which the kippers should be cured when they are intended for subsequent storage in the frozen state.

0.5 IMPROVED MEDIUM FOR RED HALOPHILIC BACTERIA FROM SALT FISH

Dussault, H. P. and Lachance, R. A. (Station Experimentale de Peche de la Gaspesie, Grande Riviere, P. Q.)
Journal of the Fisheries Research Board of Canada 9, No. 3, 157-163 (September, 1952)

The slow growth of red halophilic bacteria on culture media seriously delays the analysis of salt and salt fish samples for the presence of these microorganisms. To obtain a basic substance around which a more satisfactory medium could be made, the following materials were tried in varying concentrations: cod muscle press juice, hot and cold water extracts of fresh and salted codfish, suspensions of macerated cod muscle, acid hydrolyzates of cod muscle, potato extracts, wheat and rice flour pastes, etc. None of these materials gave any marked advantage over Lockhead's skim milk-salt agar medium for the cultivation of red halophilic bacteria. Because Lockhead's medium supported fair growth and gave a better background, it was chosen as the basis for a number of modifications.

Of a wide series of inorganic salts added to Lockhead's skim milk-salt medium, 0.5 percent $Mg(NO_3)_2$, 0.1 percent $MgSO_4$, and 0.0025 percent $FeCl_3$ showed a definite stimulating effect. The need for extra organic nitrogen was shown by the stimulation that resulted from the addition of 0.5 percent Protease Peptone No. 3 Difco. Increased development also resulted when a carbohydrate source was included in the medium. Glycerol or dextrose in one percent concentration were equally superior to lactose; however, glycerol gave a brick red shade of pigmentation along with better growth.

The proposed medium used throughout was prepared from a nutrient brine containing $MgSO_4 \cdot 7H_2O$, 5 g.; $Mg(NO_3)_2 \cdot 6H_2O$, 1.0 g.; $FeCl_3 \cdot 7H_2O$, 0.025 g.; Protease Peptone No. 3, 5 g.; glycerol C.P., 10 g.; and NaCl C.P., 200 g. in 1000 ml. of distilled water. To the first half-portion of this nutrient brine 10 percent Bacto skim milk was added; to the second half-portion 3 percent plain Bacto-agar was added. When the agar portion was thoroughly

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 ABSTRACTER: Martin Heerdt

9.10 UNDERWATER TELEVISION

Anonymous
Atlantic Fisherman 33, No. 10, 9 (November, 1952)

Underwater television is now being tested in Canada to determine its usefulness in fisheries investigations. Limnologists of the Canadian Wildlife Service are using the electronic device in Banff National Park to study some of the biological features of Lake Minnewanka.

The apparatus consists of the underwater television camera mounted in a large steel cylinder leading by means of an electrical cable to the viewing apparatus located in the boat on the surface. The large steel cylinder containing the camera can be moved forward, backward, swung left or right, and tilted up or down. A bank of four spotlights is used to light the area in front of the camera. When in the water the apparatus has very little weight.

Several lenses are fitted to the camera so that a wide field or a "close up" can be studied. All movements, viewing, and lighting of the camera are controlled by the operator at the surface.

To date, tests with this device have been conducted in waters as deep as 100 feet. In the present study the limnologists have investigated the extent of natural shelters and have observed and recorded the presence of various forms of natural food for game fish.

 ABSTRACTER: Roy C. Stevens

1.015 DEEP SEA FISHING IN THE INDIAN OCEAN

Khanna, M. L.
Modern Refrigeration 55, No. 655, 338 (October, 1952)

Since the very early part of the 20th century trawler fishing has been carried out at irregular intervals as experimental operations in the Bay of Bengal and the Indian Ocean without much success. Local craft have continued, however, to bring in the catch from coastal waters from times immemorial.

The present-day production is estimated at slightly more than 500,000 tons annually, valued at about Rs. 18 crores (£13,530,000). Vast as these figures may appear to be, the availability of fish in India comes to just under 4 lb. per annum per capita. This compares very unfavourably when we look at other parts of the civilized world.

Keeping in mind the fact that India's coastline is nearly 3,000 miles long and the fact that approximately 70 per cent. of the production described is made available from the sea and estuaries, attempts at trawler fishing towards the end of the last world war continued, and the Fisheries Section with the Ministry of Food and Agriculture kept their two trawlers operating. To receive the haul there is an ice and cold storage plant with a freezer unit at the docks in Bombay where, apart from the manufacture of 20 tons of ice daily, a 250-ton low temperature store for frozen produce, along with a 50-ton chilled fish store, is to be found. The trawlers each have a cold chamber also.

Just about nine months ago a Japanese enterprise was permitted to operate a fishing vessel, the Taiyo Maru, off the coasts of Saurashtra and Bombay, making a monthly average catch of over 100 tons. The vessel trains Indian personnel as well.

The Japanese crew, under an experienced skipper, work swiftly and quietly. From the results so far obtained, it appears that they have been doing this work for generations

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1.0146 FISH HANDLING AND PROCESSING IN U.K. PART IV

Empey, W. A.
Fisheries Newsletter (Australia) 11, No. 9, 10-11, 19 (September, 1952)

During recent years, fish landings in Great Britain have fluctuated between about 800,000 and 1,000,000 tons annually. Of this total, approximately one-fifth is made up of imported fish such as cod, haddock, plaice, and herring. The approximate percentages of the various species making up the total landings are: cod 33, herring 26, haddock 12, whiting 5, plaice 4, hake 4, saithe 3, skates and rays 2, miscellaneous 11. Herring catches are only about one-half of the prewar quantities, due largely to the loss of overseas markets. Catches of demersal or "white" species have shown considerable increase, due mainly to the exploitation of more distant trawling grounds.

Fishing voyages for the white species range in duration from overnight for the smaller inshore fishery to three or four weeks for the distant waters. The two ports of Hull and Grimsby, which together receive more than 50 percent of the total white fish landings, obtain about 95 percent and 67 percent, respectively, from distant waters. The inshore fisheries cover a large number of small ports but account altogether for only about 3 percent of the total landings.

The fishery for demersal species continues throughout the year and all types of gear including trawls, seines, and lines are used. The size of the vessels used in the fishery varies from the small inshore boats up to the large trawlers of 170 to 180 feet in length.

The annual landings of pelagic species have been between 280,000 and 300,000 tons over the past three years. Of this total, approximately 95 percent is herring and the remainder mackerel, sprats and pilchards. These species are caught mainly by drift and ring nets operated from comparatively small boats of 90 feet or less in length. The fishing grounds

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 ABSTRACTER: Roy C. Stevens

MEDIUM FOR SALT FISH BACTERIA

FISHERIES DEVELOPMENT IN INDIA

UNDERWATER TELEVISION

FISH HANDLING IN GREAT BRITAIN

1.015 (Cross Reference: 2.12)

past and one wonders how the Indian crew under training will master the technique in a short time.

Taiyo Maru has been allowed to operate for another 12 months and it is hoped that with its up-to-date equipment and highly experienced crew much knowledge will be gained to bring to light the fish resources in the Indian Ocean from waters hitherto unexplored.

In recent months, the Technical Co-operation Administration of the United Nations, in agreement with the Government of India, has made plans to augment the work done so far and a mission of fishery officials along with an expert of the T.C.A. have left for an extended study tour of countries such as U.K., Denmark, Norway, Holland, U.S.A., Japan and other parts of Asia, namely, Hong Kong, Singapore and Bangkok.

Under this agreement, a further contingent of trawlers will be made available, along with nine ice and cold storage plants to be installed nearer to coastal areas of Saurashtra, Bombay, Travancore-Cochin, Madras and West Bengal. This united effort will result in giving to India additional supplies of food very much needed from within its own waters.

The part refrigeration and refrigerated transport will play in this well-organized attempt at developing our fisheries is too obvious to need special mention.

1.0146 (Cross References: 2.3, 3.0)

are located close to the coast and most trips are for overnight only. A small part of the catch is taken near the bottom by larger vessels that remain at sea for a number of days.

The fishing season on any of the grounds lasts for not more than three months, beginning in May in the northern zones of the Shetland Islands and ending in December in the Lowestoft and Yarmouth areas of the east coast of England.

There are between 1000 and 1500 port wholesalers in Great Britain who distribute unprocessed fish through inland wholesalers or directly to retailers, fish friers, restaurants, hotels and institutions. At the main markets receiving trawled fish, unloading usually begins shortly after midnight in preparation for disposal of the fish by auction commencing about 7 a.m. By early afternoon the processors have dressed or filleted the white fish and shipped them by rail or truck packed in ice in boxes. As a rule, herring are sold in the round for processing by smoke-curing, salt-curing, canning, freezing, etc.

Approximately 80 percent of the white fish are filleted by the processors, and more than half of these fillets are said to go to fish friers, numbering between 40,000 and 45,000 throughout England and Scotland. About 13 percent of the white fish, chiefly cod and haddock, is used for smoking to produce an estimated 60,000 tons of the smoked products annually. Production of salt-cured fish accounts for only a very small percentage of the white fish, and this applies also to frozen fish.

The present annual landing of herring (approximately 270,000 tons) is utilized as follows: kippering 30 percent, fresh fish 32 percent (including 11 percent "klondyked" with ice plus salt), salt-curing 20 percent, redding 6 percent, canning 5 percent, bloatering and miscellaneous 7 percent. Very small quantities of herring are frozen for distribution as fresh fish.

0.5 (Cross Reference: 3.5)

melted and the skim milk brine in good suspension and lightly warmed, equal amounts of each were carefully combined. When thoroughly mixed, 15-to 20-ml. quantities of the medium were transferred immediately into petri dishes with the aid of a rapid-delivery pipette.

When the medium is prepared in the foregoing manner, sterilization is not required, as evidenced by the incubation of uninoculated controls without a trace of any contamination. It would appear, therefore, that the stock nutrient brine and salt agar can be kept in the cold for several weeks without alteration. Improved results did not materialize from attempts to buffer the medium with the ordinary salts.

Lockhead's codfish medium (Medium B, 1934), his skim milk-salt medium (Medium C, 1934), Hess' modification of Lockhead's medium C (1942a), and the improved medium all were prepared and inoculated for the purpose of comparison. Individual drops of inoculum were transferred by means of a pipette to the surface of the agar media in petri dishes. All plates were held at 37°C. and removed once daily for visual examination.

Figure 1, omitted, and Table III, below, clearly show that development was observed on the improved medium in half the time required by the other media. In addition, the improved medium gave a volume of growth several times heavier on the basis of film thickness and intensity of pigmentation.

TABLE III. Comparison of media for the time required to evidence beginning of growth of red halophilic bacteria

Media	Time in days at 37°C. Heavy inoculum	Light inoculum	Contaminated brine
Lochhead's medium B	5	6	10
Lochhead's medium C	4	5	10
Hess's modified medium	4	5	10
Improved medium	2	3	5

9.10 (Cross Reference: 2.116)

3.33 TOMATOES IN THE SUMMERTIME; TURTLE SOUP AND CHILI IN THE WINTERTIME

Anonymous
Food Packer 33, No. 11, 28-29 (November, 1952)

An Ohio tomato canner, in an effort to develop a year-round operation has established a flourishing business in the production of canned turtle soup and turtle chili.

Turtles for the company's products include the fresh-water varieties weighing from 40 to 75 pounds, and the large sea turtles weighing several hundred pounds. Arriving at the plant either alive or rough-dressed at intervals throughout the year, the turtles are completely dressed and canned in No. 10 cans for storage. During the packing season, then, the meat is used as needed.

In the manufacture of soup, tomato puree is used as a base to which is added, in varying amounts, ground fresh-water turtle meat, diced cabbage, celery, rice and onions, fresh boiled eggs, grated lemon, spices of several varieties, and browned flour. The flour is specially made by mildly scorching regular white flour in a home-made device. The owner of the plant states that this browning process affects the starch and adds a distinct flavor to the soup.

The mixture is cooked in huge, overhead vats until it has reached the proper consistency. It then goes by gravity to the automatic filler where the cans are filled.

The chili product is prepared and packed in essentially the same way as the soup. In this item the red meat of green sea turtles is used. Onions, Mexican red beans, chili powder, tomato puree, and spices complete the chili mixture. This product is designed for

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 ABSTRACTER: Roy C. Stevens

2.19 BACTERIOLOGICAL STUDIES ON SHRIMP

Williams, O. B. (Department of Bacteriology, University of Texas)
Seafood Business 5, No. 2, 16, 18, 73 (September, 1952)

Recent studies conducted at the University of Texas consisted of determining the total number of bacteria on shrimp as captured, the kinds of bacteria present, and the significance of the various kinds as causes of deterioration.

It was found that the bacteria were on the surface of the shrimp and in the intestinal tract, not in the tissue. Since the same types were found to occur in the intestinal tract as on the surface, determinations of total numbers were made by shaking selected shrimp with a measured quantity of water to wash off the attached bacteria and making cultures of the washings. There appeared to be no correlation between the size of the shrimp and the number of bacteria carried.

The most important single factor affecting the total number of bacteria on individual shrimp seemed to be the amount of washing the shrimp received before selection for examination. It was observed that most of the bacteria were carried on the head portion where mud was also found to be most abundant. It was thus established that sea mud, carried principally by the appendages of the head portion, is a major source of bacteria. Sea water was not considered to be a source of the bacteria since counts on sea water were quite low. Heading and thorough washing of the tails before icing is recommended to reduce the bacteria load and thereby delay quality loss.

The kinds of bacteria carried by shrimp were found to be the same as those found on other marine products.

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 ABSTRACTER: Roy C. Stevens

2.111 SWEDISH EXPERIMENTS WITH NYLON FISHING NETS

Anonymous
U. S. Department of the Interior, Fish and Wildlife Service, Fishery Products Report No. 203, Seattle, Washington (October 16, 1952)

Experiments with fishing nets made of spun nylon have been carried out since 1947 by the Swedish Institute of Fresh-Water Research at Drottningholm, reports an American Consulate dispatch dated September 24 from Gothenburg. These experiments have evidently given satisfactory results and catches have generally been at least twice as large as when similar cotton nets were used.

For some months experiments with nets made of drawn nylon thread have been carried on in different lakes and streams in Sweden. The results of these tests have been excellent, but trials will continue up to the end of this year. When comparing the results obtained from nets made of cotton, spun nylon, and drawn nylon, they were in the ratio of 1, 2, and 7, respectively.

One difficulty found with the drawn nylon nets is that no machines are as yet available for tying the net knots, and for this reason the nets must be made by hand.

The experiments to date show that the possibilities of fishing with drawn nylon nets are undoubtedly most promising and results have been far above expectations.

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3.26 LOCKER PLANTS PRESENT MARKET OPPORTUNITY

Balkovic, Robert D. (Branch of Commercial Fisheries, U. S. Fish and Wildlife Service)
Southern Fisherman 12, No. 10, 38-39 (October, 1952)

A survey conducted early in 1952 by the U. S. Fish and Wildlife Service indicated that 75 percent of the locker plants in Pennsylvania were selling fishery products to their customers. Similar surveys are being conducted in New England and midwestern states. The findings serve to demonstrate the present and possible future importance of the locker plants as an outlet for frozen fishery products.

The Pennsylvania survey found that 228 locker plants are selling a total volume of more than one million pounds of frozen fish and shellfish annually to more than 125,000 patrons. This volume has been achieved despite the fact that most operators are making no special effort to promote their fishery products sales.

Most purchases of fishery products in locker plants have been in one-to three-pound quantities for immediate consumption. Few Pennsylvania locker plant operators were found to be encouraging quantity purchases of fish and shellfish at discount prices.

In some cases it was found that the locker plant operator's lack of knowledge of how to purchase, handle or prepare fishery products was one of the greatest handicaps to an effective sales program. For this reason, much time was spent by the Service representative answering many questions concerning the availability and merchandising of fishery products.

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 ABSTRACTER: Roy C. Stevens

TURTLE SOUP AND TURTLE CHILI

NYLON NET EXPERIMENTS

BACTERIOLOGICAL STUDIES ON SHRIMP

LOCKER PLANT SALES OF FISHERY PRODUCTS

3.26

It is felt that producers and distributors of fishery products can render a great service by disseminating more complete information on their products to the locker plant operators. This information should include a brief story on the product's life history, methods of fishing and processing, and some suggested recipes for its proper preparation.

A greater use of point-of-sale advertising material is also suggested.

3.33 (Cross Reference: 1.93)

non-meat eaters and is said to be receiving enthusiastic consumer acceptance. The packer states that the product has no fish taste whatsoever and that it "tastes like a high-quality beef chili."

2.19 (Cross References: 1.85, 2.01)

In studies to determine the effect of different conditions of storage, shrimp immersed in ice in glass jars and shrimp under dry ice storage lost quality rapidly, whereas those held in ice and kept from contact with water from the melting of the ice by a false bottom in the packer were kept in good commercial condition for at least 16 days, although storage for no more than 12 days seemed to be desirable. Further study is necessary to determine the minimum amount of ice that should be used for a given volume of shrimp in order to secure maximum retention of quality without unnecessary sacrifice of storage space.

The best size of ice particle to use needs to be established. Flake ice is said to be unsatisfactory for shrimp. Snow ice may introduce problems due to bridging and channeling. Contact of the shrimp with melting ice is essential for maximum protection. Turning and reicing at intervals may be worthwhile. In any case, it is important that shrimp be kept clear of the water that accumulates from the melting of the ice in which they are stored, since this water has been found to be rich in spoilage bacteria.

2.00 CHEMISTRY AND ADVANCES IN FISH PROCESSING

Lovern, J. A.
Chemistry and Industry, No. 39, 948 (September 27, 1952)

The outstanding contribution which chemistry can make to advances in fish processing techniques is in respect of background knowledge of the composition of fish and the changes which occur in it during processing. Direct use of chemicals on fish is almost certain to conflict with food and drug regulations.

The most urgent problem of today in the British fishing industry is the fact that the greater part of the catch is obtained on far distant grounds, e.g. up to five days steaming from the home port. This period, added to the week or more spent fishing on the grounds, means that much of the catch has been two weeks or more in ice when it reaches the consumer. Chemical studies have contributed much to our knowledge of the course of spoilage of fish stowed in ice. There are three broad phases: (1) the period until the fish has passed out of rigor mortis, during which no bacterial invasion begins; (2) bacterial multiplication and conversion of trimethylamine oxide into trimethylamine; (3) extensive bacterial attack on the fish proteins, with production of ammonia, indole, etc. For practical purposes phase (2) is the important one. Study has been made of bactericides as an adjunct to ice, the most promising one being carbon dioxide at a fairly high concentration in the fish room atmosphere.

The freezing and cold storage of fish completely stops bacterial attack, but permits other types of spoilage to occur, e.g. autolysis and atmospheric oxidation of such constituents as fat. It has been found that oxidation of fat in cold-stored fish is powerfully catalyzed by the action of the muscle respiratory pigments, particularly by cytochrome C. The oxidation is most effectively controlled by excluding air from the system,

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3.30 AUSTRALIA'S CANNED FISH INDUSTRY

Knox, Peter
Pan-American Fisherman 7, No. 4, 13 (November, 1952)

In 1950-51 the 12,210 miles of Australian coastline yielded $16,000,000 worth of scale fish, prawns, oysters, whale oil and meal, mother of pearl and trochus shell. In the same period $1,800,000 worth of frozen crayfish tails were exported to the United States.

With this production has come a great growth in the Australian canned fish industry. From practical nonexistence in 1938, the industry has grown to one with a capital valuation of $2,240,000. Despite this growth, however, present production satisfies only about one quarter of Australia's annual requirements for canned fish.

Fish canning on the Australian mainland began on a permanent basis in 1938 in an old boatshed at Narooma, a small community on the south coast of New South Wales. By 1940 this company had in production a modern $55,000 plant with an annual capacity of 8,000,000 12-ounce cans.

Canneries were also established in every state except Queensland. At present there are 17 plants in Australia wholly or mainly engaged in canning fish. The largest canning state is the island of Tasmania which produces over 40 percent of the annual Australian output. Australian salmon, barracuda, tuna, whitebait, mackerel, pilchards and minor quantities of other fish are processed, salmon and barracuda accounting for about 90 percent of the total output.

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 ABSTRACTER: Roy C. Stevens

3.33 FISH HANDLING AND PROCESSING IN U. K. -- CANNING

Empey, W. A. (C.S.I.R.O. Division of Food Preservation)
Fisheries Newsletter (Australia) 11, No. 10, 10-11 (October, 1952)

Herring is the principal fish canned commercially in Great Britain, but small quantities of other species such as sardines, sprats (brisling) and sild (immature herring) are also used.

If the herring are not canned the same day they reach the cannery, they may be lightly sprinkled with salt and held until the next day. Occasionally the fish may be iced one to two days before canning. The fish are headed and gutted by hand or by machines that handle 50 to 120 fish a minute. They are then washed in rotary cylindrical wire mesh washers with internal sprays that remove most of the scales. After brining for about 30 minutes in an 80-degree salinometer brine, except where the fish have been salted in the round, they are drained in metal baskets and packed by hand into 12-ounce oval cans. A paper liner is placed on top of the fish before the cans are clinch covered, heat exhausted, closed and retorted.

In canning kippers, paper is placed between each fish to prevent sticking and to improve the appearance of the pack.

Pilchards are canned in a manner similar to that for herring and both tall and oval cans are hand packed, with or without tomato puree. The cans are not generally inverted and drained after exhausting.

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 ABSTRACTER: Roy C. Stevens

3.4 FISH HANDLING AND PROCESSING IN U. K. -- SMOKING

Empey, W. A. (C.S.I.R.O. Division of Food Preservation)
Fisheries Newsletter (Australia) 11, No. 10, 10 (October, 1952)

One of the oldest methods of fish preservation in Great Britain is a combination of salting and smoking. At present, more than 20 percent of the fish landed is converted into smoke-cured products, totalling about 150,000 tons annually.

The three principal species used for smoke curing are, in order of importance, herring, haddock and cod. Other species used in relatively small quantities for smoking are whiting, saithe, cusk, salmon, sprats, fresh water eels and pilchards. Smoked roes from cod and ling are also produced.

The commercial products obtained from the different species by variations in processing and their pre-treatment are known as kippers, kipper fillets, buckling, silvers, bloaters and reds, which are all produced from herring; finnans from haddock and small cod; pale cure from haddock; fillets from cod, large haddock, saithe, etc.; smokies from small haddock or whiting; and sardines for canning from brisling or sild.

White fish and herring are generally smoked in separate plants. The smaller plants have a capacity of about one ton of raw material per day and the larger ones up to 6 or 7 tons per day. It is estimated that there are several hundred fish smoking plants in Great Britain.

The great majority of the fish available for smoking is used to prepare lightly-smoked and relatively mild flavored cures. Most hard smoked products are prepared for export.

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 ABSTRACTER: Roy C. Stevens

ADVANCES IN FISH PROCESSING

FISH CANNING IN GREAT BRITAIN

AUSTRALIAN CANNED FISH INDUSTRY

SMOKING FISH IN GREAT BRITAIN

3.33 (Cross Reference: 1.0146)

There is also a small production of hot-smoked sprats and small pilchards canned in oil.

Automatically controlled retorts providing for pressure cooling are standard equipment in the up-to-date canneries.

3.4 (Cross Reference: 1.0146)

Kippers, a typical cold smoked product, are made from fat herring, split by hand or machine along the back to leave the backbone on one side. Without removing the heads, the gills and viscera are taken out and the split fish thoroughly washed. After brining for 20 to 30 minutes in a 70- to 90-percent salt solution containing a small amount of a harmless yellow dye such as anatto, the fish are suspended on tenter hooks. When they become tacky to the touch, the fish are hung in tall kilns, usually overnight, over lines of fires of lighted wood chips and almost smothered with sawdust, such as oak, to produce a dense cool smoke. In order to obtain a uniform cure in this type of kiln, it is necessary to turn the sticks of fish and at the proper time to exchange the positions of the upper and lower lots.

Bloaters, which are prepared from whole ungutted herring, are usually dry salted in vats overnight and cold smoked over billets of wood to provide heat rather than smoke. Red herring are treated in a similar manner except that they are dry salted for much longer periods and then cold smoked intermittently for about one week. Buckling, also prepared from whole ungutted herring, are dry salted overnight prior to hot smoking at about 200°F. in a dense smoke for 3 to 4 hours, after a preliminary drying at a fairly low temperature.

Fish that has been lightly cured and smoked will remain in good condition for only a few days at ordinary temperatures. When the product is to be held for one to two weeks it should be kept at about 32°F. For longer periods the fish are frozen and held at 0°F. or lower.

2.00

e.g. by means of a coating of ice. The addition of antioxidants to the fish or to the ice glaze is claimed to be useful, but some of the results are ambiguous.

The process of fish smoking is a most complex chemical sequence. The constituents of wood smoke, as produced in the usual smouldering fire, do not resemble those of the destructive distillation of wood, but suggest that the primary distillation products have been extensively hydrolyzed in passing through the zone of damp wood above the smouldering area. The polyphenols of the smoke are presumably derived from the lignin fraction. When smoked fish are kept for some time, little microbiological attack begins until the concentration of phenols on the fish abruptly begins to decrease. Present studies are directed towards a fuller knowledge of the effective smoke constituents as deposited on the fish and the relationship between these and the metabolism of the eventual microbiological spoilage agents.

3.30 (Cross Reference: 1.017)

Canned fish production is limited only by the yields of the fishing grounds. Inshore fishing in southeastern Australia -- the most heavily populated area -- is already being exploited to capacity. However, there are great undeveloped trawling areas that have been neglected because of their distance from the centers of population. Air freighting is expected eventually to solve these distance problems.

Commercial quantities of tuna exist in Australian waters and efforts are being made to expand this fishery.

With her population rising at the rate of 2.6 percent annually through immigration and natural increase, it seems likely that the Australian demand for canned fish will rise steadily.

2.14 REACTIONS OF HERRINGS, SPRATS AND PILCHARDS TO LIGHT

Richardson, I. D. (Fisheries Laboratory, Lowestoft)
World Fishing I, No. 7, 239-244 (October, 1952)

Artificial light has been used in many parts of the world as a means of attracting fish and thereby increasing catches. Sardine fishermen of the Mediterranean use flares to attract the sardines to their boats before the nets are shot. Strings of lights are used in Japan to guide fish into fish traps, and recently it has been reported that Norwegian fishermen are utilizing searchlights directed over the side of the ship to lure herring up to shallower depths where the nets can be used more effectively.

During the past few years the effect of using light as an attraction for herring and pilchard shoals has been investigated. When a 24-volt, 60-watt searchlight was directed vertically into the sea, the level of a shoal of pilchard, observed on the echo sounder, was seen to rise. After turning the light off, the shoal descended to its original depth level. The exact opposite reaction, however, was exhibited by herring. When the searchlight was turned on over a shoal of herring, it was seen to descend about 30 feet. As soon as the light was switched off, the fish rose to their former level, where they remained until the light was turned on again. The thought that this reaction was the result of the initial shock was dispelled by repeating the experiment and keeping the light on for periods of over five minutes. Still no sign of rising was observed. When lights of greater or less intensity were used, the same result was obtained to a greater or lesser degree.

Experiments will be continued on the lines described to see whether lights of certain intensities or wave length affect fish differently, i.e., whether low-intensity lights or perhaps ultra-violet lights will attract fish. Some experiments have been carried out on

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 ABSTRACTER Dayton L. Alverson

4.64 A SIMPLE METHOD FOR THE IMPROVEMENT OF THE KEEPING QUALITY OF OILS AND FATS

Bertram, S. H. and Wynia, G. M. (Laboratory N. V. Ned. Research Centrale, The Hague, Holland)
Journal of the American Oil Chemists' Society 29, No. 12, 629-631 (December, 1952)

An accelerated oil stability test based on aeration of the oil at 80°C. and determination of Lea peroxide values has been developed. The oxidation was never carried beyond a Lea peroxide value (L) of 7. The rate of increase of L with time (t) or dL/dt is used as an index of the susceptibility of the oil to oxidation. The relatively low (80°C.) incubation temperature (rather than 99°C. as used in the Swift test) is employed because at too high temperatures the rate of peroxide decomposition may exceed its rate of formation, thus giving misleading results.

Using dL/dt as an index it was determined that when 0.05% sulfur is added during deodorization (by steaming) of an oil, the susceptibility to oxidation is reduced; sometimes a protection factor of as much as 4 is achieved by this procedure. The protection factor is inversely proportional to the iodine number of the oil. Oils having iodine values above 175 are not generally affected by the sulfur treatment.

During the sulfur treatment very little sulfur is actually absorbed by the oil. Best results are obtained when the sulfur is added and the oil steamed for 4 hours at 180°C. Little or no change in the flavor or color of the oil results from this treatment.

Addition of gallates as antioxidants to sulfur-treated oil gives additional protection, the effect of gallates and sulfur being additive.

 ABSTRACTER: M. E. Stansby

5.41 THE ANIMAL PROTEIN FACTOR OF COD LIVER

Hoogland, P. L.
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 54, 3-4 (September, 1952)

Experiments are described which evaluate the nutritional quality of the residue of cod livers remaining after rendering. Chickens were used as the experimental animals in the growth experiments.

Four types of cod liver residue were used in the work:

1. Liver residue, dried without bisulfite, not defatted;
2. Liver residue, dried with bisulfite, not defatted;
3. Liver residue, dried without bisulfite, defatted;
4. Liver residue, dried with bisulfite, defatted.

These materials were added to the basal corn-soybean meal chick ration. The defatted samples were fed at a 3 1/2% level and the other samples were fed at 7%. Another group of chicks were fed the basal ration with added crystalline vitamin B_{12}.

The results were as follows:

1. Any ration with liver residue was better than either the basal ration or the basal ration with added B_{12}.
2. Drum-drying without bisulfite does not impair the nutritional value of the residue.

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 ABSTRACTER: W. N. Sumerwell

6.130 BIOCHEMISTRY OF FISH

Anonymous
Report of the Food Investigation Board (Great Britain) for the Year 1951, 11-12 (1952)

Alkaline hydrolysis of fish proteins

A study has been made of the effect of alkali concentration, protein concentration, and temperature on the evaluation of ammonia from haddock actomyosin. At temperatures of 70° to 100°C. (158° to 212°F.) alkaline hydrolysis produces considerably more ammonia than acid hydrolysis. In these experiments the Van Slyke ninhydrin method for the estimation of free amino acids and the Spies and Chambers' colorimetric method for the estimation of free amino groups were used to follow the hydrolysis of haddock actomyosin. By comparing the results obtained by the two methods it has been possible to calculate approximately the average length of the peptide chains produced during partial hydrolysis. The foregoing methods have been used to measure the extent to which the proteins of herring are hydrolyzed in the Torry alkali-reduction process for oil and meal.

Oxidation of unsaturated fats and fatty acids

Atmospherically oxidized linoleic acid can be separated from unoxidized linoleic acid simply by shaking in a mixture of low-boiling petroleum ether and 80 percent methanol. As a result of the difference in their solubilities the linoleic acid will dissolve in the petroleum ether, whereas the oxidized fraction will dissolve in the methanol. The layers can be separated on standing. Analyses of the oxidized fractions obtained by the foregoing method (some of which have had peroxide values between 85 and 100 percent of the theoretical for a monohydroperoxide) have shown them to be mixtures of oxidation

(over)

 ABSTRACTER: Martin Heerdt

REACTIONS OF FISH TO LIGHT

GROWTH FACTOR IN COD LIVER RESIDUE

RANCIDITY TESTS AND ANTIOXIDANTS

BIOCHEMISTRY OF FISH

5.41

3. The dried but not defatted residue is slightly better as a food constituent than the dried and defatted residue. This is probably due to the presence of essential fatty acids in the fat-containing samples.

4. Liver residues contain substances besides vitamin B_{12} that promote growth of young chicks on a ration low in APF.

Further experiments were carried out and indicate that the desoxyribosides of four purine and pyrimidine bases occur in cod liver residue and have growth-promoting activity.

6.130 (Cross Reference: 4.21)

products. The presence of esters and of conjugated and non-conjugated products also has been indicated. Whether a conjugated tri-ene isolated from the mixture has been produced as a result of the method used for isolation or whether the third double bond is formed during oxidation has not been determined. Constituents of the oxidized fraction can be separated by the use of alcohol and petroleum ether. The latter separation indicates that there may be two major constituents, one of which can be moved by the petroleum ether and one that cannot be moved.

2.14 (Cross Reference: 1.2)

the use of ultra-violet light for attracting fish but it has not yet been possible to show any noticeable reaction by herring to this type of light. Beebe, an American scientist, has had success in attracting certain fish with ultra-violet light.

4.64 (Cross Reference: 7.872)

8.51 EXTRACTIVES OF FISH MUSCLE

Anonymous
Report of the Food Investigation Board (Great Britain) For The Year 1951, 13 (1952)

At least 17 amino acids as well as creatine, creatinine, trimethylamine oxide, mono- and dimethylamines, ammonia, and the dipeptide anserine, were found in the basic fraction of the extracts of fresh haddock muscle by means of ion-exchange column separation techniques. The presence of the compounds other than the amines, ammonia, trimethylamine oxide, creatine and creatinine in haddock muscle is now recorded for the first time. Extracts of fresh cod, whiting, dogfish, skate, herring, and perch also have been examined at Torry Station. Differences between most species have been marked; however, related species such as haddock, cod, and whiting gave comparatively similar results. Anserine and methyl histidine appeared to be confined to the gadoids, sarcosine to the elasmobranchii, and betaine to the skate only. The use of these findings as a possible chemical means for the identification of species is indicated.

 ABSTRACTER: Martin Heerdt

5.2 MODE OF ACTION OF THIAMINASE

Anonymous
Nutrition Reviews 10, No. 10, 301-303 (October, 1952)

In 1936 a paralytic disease was observed in ranch foxes receiving whole raw fish in their diet. The disease was found to be due to the enzyme thiaminase which destroys vitamin B_1 by hydrolytically cleaving the thiamine molecule between the thiazole and the pyrimidine rings. Thiaminase is also found in shellfish and in the intestinal organism, Bacillus thiaminolyticus.

Estimation of the thiaminase content of tissues is made by extracting the enzyme from the sample with aqueous acid solutions. A measured quantity of thiamine is incubated for one hour with the thiaminase extract. The amount of vitamin remaining after incubation is estimated by the thiochrome method and the amount of thiaminase present is expressed in terms of the amount of vitamin destroyed.

Extensive studies on the nature of the thiaminase reaction have shown that aromatic amines tend to stimulate the activity of the enzyme. Aniline is most effective. Pyridine and quinoline also produce marked activation. In order to accelerate the action of the enzyme, compounds must have an amino group attached directly to the ring or a substituted amino group. Sulfhydryl compounds are effective as stimulants, particularly of the bacterial enzyme.

It has been shown that when pyridine is used as the activator for the reaction between thiaminase and thiamine, a green-yellow fluorescing compound called "heteropyrithiamine" is produced. This compound contains the pyrimidine part of thiamine

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 ABSTRACTER: W. N. Sumerwell

0.32 THE SETTING PHENOMENON OF FISH MUSCLE. II. INFLUENCE EXERTED BY ALKALINE SALTS

Migita, Masao and Okada, Minoru
Bulletin of the Japanese Society of Scientific Fisheries 18, No. 4, 159-170 (1952)

The influence of alkaline salts on the jellification of the proteins of fish muscle was investigated by grinding horse-mackerel meat with solutions of alkaline salts of various concentrations. The ratio of water to protein ranged from 3:1, approximately the ratio occurring in the natural material, to 8:1.

The extent of setting was determined by measuring jelly strength and by visual observation. The following stages were recognized: the original ground paste, lusterless and rosy; sticky paste, lustrous and rosy; jelly, lustrous and rosy; paste losing its stickiness, lustrous and rosy; jelly, lustrous and rosy; highly elastic jelly, lustrous and whitish; brittle jelly, lusterless and whitish; easily crushable jelly, lusterless and whitish.

Results:

1. In high concentration of salts (3 M), muscle protein was salted out.
2. In moderate concentration (0.2-1.0 M), some salts influenced jelly formation; others did not, depending on the anions present. The anions formed a lyotropic series in their influence on jellification.
3. In low concentration (0.05-0.2 M), all salts, including sulfate, caused the setting of meat, provided the concentration of protein was adequate.
4. Sulfate tended to inhibit jelly formation by other salts. The inhibiting action increased with the concentration of sulfate and varied in extent, depending on the particular salts present. For example, the effect on chlorides was greater than the effect on nitrates, and the effect on nitrates was greater than the effect on thiocyanates.

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 ABSTRACTER: F. Bruce Sanford

2.19 PRODUCTION OF CARBON DIOXIDE BY FISH STOWED IN ICE

Anonymous
Report of the Food Investigation Board (Great Britain) For The Year 1951, 13 (1952)

After a normal five- or six-day journey from the fishing grounds the air in the hold of a distant-water trawler may contain up to 5 percent carbon dioxide. Concentrations as high as 12.5 percent, however, have been recorded in pocket areas. In the case of vessels returning from Greenland waters, where the homeward journey may take up to 9 days, as much as 9 percent carbon dioxide and as little as 4 percent oxygen have been found. On the basis of these observations and experiments in the laboratory the respiration quotient $\left[\frac{\text{carbon dioxide produced}}{\text{oxygen consumed}}\right]$ seems to be about 0.5.

The storage of fish in ice is customarily looked upon as a problem of removing sensible heat from the fish and overcoming heat leakage from the deck and sides of the vessel. Small scale experiments, however, have indicated that the heat produced during the storage of fish in ice is of considerable magnitude. In one of these experiments a small haddock, stored in ice in a cooled vacuum flask held at 0°C. (32°F.) for 17 days, produced enough heat to melt one-half of its own weight of ice.

 ABSTRACTER: Martin Heerdt

FISH MUSCLE EXTRACTIVES

ALKALINE SALTS AND MUSCLE GEL FORMATION

ACTION OF THIAMINASE

PRODUCTION OF CO_2 BY FISH STOWED IN ICE

0.32

5. Some salts, at concentrations too low to make meat set, promoted setting if present with other salts.
6. Anions that are easily adsorbed when present beyond a certain amount overshadowed the jellifying effect of less adsorbable anions, even if the latter were present in considerable concentration.
7. Sulfate in low concentration (0.1 M) acted positively, negatively, or with no effect on the jellifying influence of other salts, depending on the concentration of the latter.
8. The lithium, sodium, and potassium ions did not differ appreciably from each other in their effects.
9. In moderate concentrations, both I^- and CNS^- produced early jelly formation during grinding. These jellies were brittle, and, when induced by concentrations of salts, were easily crushable.

Discussion:

The setting of fish muscle is probably induced by the hydration of anions that have been surface-chemically adsorbed on the protein molecule. In addition to this surface-chemical adsorption, at low concentrations of electrolyte ions (0.05-0.1 M), the electrostatic attraction between the electrolyte ions and the ionic groups in the proteins seems to contribute partly to setting. The strongly adsorbable ions probably replace the less adsorbable ions by driving them out of the surface of the colloid. Such a substitution may account for the readily adsorbable ions overshadowing the effect of the less adsorbable ions.

The complex behavior of the sulfate ion is interpreted as follows: The inhibiting action of SO_4^{--} on the effect of co-existent anions may be caused by competition for water between the adsorbed anions and the sulfate ion, which has been but little surface-chemically adsorbed and so remains free in solution. However, at low concentration, the amount of free SO_4^{--} is so small that the inhibiting action may be negligible. Moreover, the effects resulting from the electrochemical adsorption of SO_4^{--}, which would be obscured by surface-chemically adsorbed ions present in higher concentration, may possibly appear. Thus SO_4^{--} can also induce jellification in low concentrations and promote the effect of co-existing salts when SO_4^{--} and these salts are present together in concentrations of 0.1 M. If the concentration of the co-existing salt increases, surface-chemically adsorbed SO_4^{--} is driven off by the more adsorbable anion. This results in increase of free SO_4^{--} and consequently the sulfate acts inhibitingly.

5.2

attached to pyridine. Consideration of the pyridine reaction has led to the conclusion that the destruction of thiamine by thiaminase is not a simple hydrolysis but a base exchange reaction.

Attempts have been made to separate the coenzyme from the apoenzyme of shellfish and bacterial thiaminase. Repeated precipitation with acetone yields a solid fraction containing the apoenzyme which is very unstable. This fraction has enzymic activity when heterocyclic amines or aromatic amines are added as coenzymes. Deamination of activating amines stops the activity of the enzyme system.

Efforts to synthesize thiamine by incubating a pyrimidine base and 4-methyl-5-beta-hydroxyethylthiazole with thiaminase have been partially successful. The equilibrium point for this reaction appears to be far in the direction of the breakdown of the vitamin.

0.32

STUDIES ON THE FISH PROTEINS. II. COAGULATION TEMPERATURE OF THE MYOSIN AND ITS VISCOMETRICAL DETERMINATION

Suyama, Michizo
Bulletin of the Japanese Society of Scientific Fisheries 17, No. 5, 135 (1951)

The coagulation temperature of the myosin isolated and purified from the fresh muscle of carp is usually determined by measuring the lowest temperature at which it is precipitated from a solution, as shown in Table 1. This method, however, is not always suitable.

The author determined coagulation temperature by means of an Ostwald viscometer. When the data obtained were plotted, the first break in the curve indicated the beginning of the flocculation of myosin by heat denaturation and the second, the coagulation temperature of myosin.

The viscometrical determination, however, was not suitable for salt-free precipated proteins.

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 ABSTRACTER: Roy C. Stevens

2.06

STUDIES ON THE UTILIZATION OF FISH MEAL FOR FOOD

Higashi, H.; Nitta, T.; Nagakura, K.; and Umenmoto, S.
Bulletin of the Japanese Society of Scientific Fisheries 17, No. 6, 147 (1951)

"A. We studied the preparation of edible fish paste from fish meal by means of mould (Aspergillus oryzae).

Our process is as follows.

1. Fish meal was softened and swelled by boiling with ca. 1% NH_4OH solution. By this treatment the rough and sand-like touch of fish meal is removed.
2. Starch is added to the softened, swelled fish meal and mould using Aspergillus oryzae. Moulded fish meal is mixed with NaCl and water. And then the mixture is fermented for 10-20 days at 30-35°C.

Softening and swelling process of fish meal was effective to accelerate the enzymic digestion of fish meal during the moulding process.

B. We studied also on the changes of fish meal caused by moulding process. Results obtained are as follows.

1. Decrease of crude protein was slight.
2. Monoamino-N was decreased and cystine was decreased extremely.
3. Decrease of crude fat was very much but that of unsaponifiable matter was not remarkable.
4. The production of ergosterol in moulded fish meal was observed."

 English summary

0.32

STUDIES ON THE MUSCLE OF THE AQUATIC ANIMALS. 9. THE CHANGE OF THE HEAT COAGULATION CURVE OF THE FISH MUSCLE PLASMA

Simidu, Wataru and Takuma, Hitosi.
Bulletin of the Japanese Society of Scientific Fisheries 17, No. 4, 103 (1951)

"In the present work, we found that the heat coagulating curves of the plasma of fish muscle were divided into two types: one was smooth in curvature up to 65°, and the other was divided into several stages between 30° and 65°. The former was observed in the fresh muscle, and the latter in the non-fresh muscle. We presume, therefore, that the protein of the fish muscle plasma, which is originally single, may change into several kinds of protein with different coagulating temperatures. The curve above 65° may be resulted by the serum albumin originated from the blood."

 English summary

0.32

STUDIES ON THE MUSCLE OF THE AQUATIC ANIMALS. 10. HYDRATION AND DEHYDRATION OF FISH MUSCLE

Simidu, Wataru and Takeda, Kazuo
Bulletin of the Japanese Society of Scientific Fisheries 17, No. 5, 132 (1951)

"The fish muscle increases in weight while it keeps the freshness, by absorbing water when it is cooked in water. And if this heated muscle is soaked in saline water, the increase in weight becomes more intense. The change seems to be greater when it is cooked in higher temperature. On the other hand, if the temperature reaches to a certain limit, the muscle decreases in weight, while in the former case it increases, owing to the heat coagulation of protein.

"As a result of the composition of these opposite actions, a peak appears on the hydrating curve. The peak becomes low more rapidly in accordance with rising of the previous temperature and moves into the lower side of the temperature as the time of pickling extends.

"The maximum point of the dehydrating curve lies at near 60° which corresponds with the coagulating point of myogen. And the curve corresponding to the coagulating point of myosin doesn't appear. We consider, therefore, that there is only one kind of coagulable protein in fish muscle while it is fresh."

 English summery

COAGULATION OF MYOSIN

HEAT COAGULATION OF FISH MUSCLE PLASMA

FISH MEAL FOR HUMAN FOOD

HYDRATION AND DEHYDRATION OF FISH MUSCLE

0.32

Table 1. Effect of the temperature on the solubility of myosin in 1 N potassium chloride solution at pH 8.6
(Myosin solution (0.1506 g. of protein were dissolved in 100 c.c. of 1 N potassium chloride solution) was used for determination.)

Temperature	grams of myosin pptd. from 100 c.c.	Remarks
30.0	0.024	Viscous liquid with opaline color
33.0	0.024	"
35.0	0.028	"
37.0	0.031	"
39.0	0.043	"
41.0	0.058	"
43.0	0.082	Solution was turbid
45.0	0.125	Flocculation was occured
47.0	0.136	"
50.0	0.143	"
53.0	0.145	"

0.12 DEMINERALIZATION OF SALINE WATERS

U. S. Department of the Interior, Office of Saline Water Research Coordination, Washington 25, D. C.,66 pages with bibliography

0.5 MICROBIOLOGICAL SYNTHESIS OF VITAMIN B_{12} BY PROPIONIC ACID BACTERIA

Leviton, Abraham and Hargrove, Robert E.
Industrial and Engineering Chemistry 44, No. 11, 2651-2655 (November, 1952)

(Abstract of this article appears under 5.41 page 7)

0.6 CHEMICAL STUDIES ON THE SUBSTANCE OF FISH SMELL. V. AROMA OF COOKED FISH

Obata, Yataro and Yamanishi, Tei
Bulletin of the Japanese Society of Scientific Fisheries 17, No. 10, 326 (1951)
(In Japanese with English summary and tables)

"The following facts have been made clear by our present investigations.
(1) The aroma of broiled fish and broiled eel, both prepared with soy and sugar, is attributable to the presence of piperidine as its mother substance.
(2) The aroma of fresh fish soup is produced by the reaction of vitamin B_1 and glutamic acid monosodium salt.
(3) The characteristic aroma of dried cuttle fish is attributable to the presence of taurine as its mother substance."

1.01 ROLE OF INTERNATIONAL LAW IN INCREASING WORLD FISH PRODUCTION

Anonymous
Atlantic Fisherman 33, No. 10, 14 (December, 1952)

1.0146 FISH HANDLING AND PROCESSING IN U. K. -- CANNING

Empey, W. A.
Fisheries Newsletter (Australia) 11, No. 10, 10-11 (October, 1952)

(Abstract of this article appears under 3.33 page 15)

1.0146 FISH HANDLING AND PROCESSING IN U. K. -- SMOKING

Empey, W. A.
Fisheries Newsletter (Australia) 11, No. 10, 10 (October, 1952)

(Abstract of this article appears under 3.4 page 15)

1.017 AUSTRALIA'S CANNED FISH INDUSTRY

Knox, Peter
Pan-American Fisherman 7, No. 4, 13 (November, 1952)

(Abstract of this article appears under 3.30 page 15)

1.017 FISH AND FISHERIES OF AUSTRALIA

Roughley, T. C.
Nature 170, No. 4328, 593 (October 11, 1952)

1.2 FREEZING AND COLD STORAGE

Anonymous
Report of the Food Investigation Board (Great Britain) For The Year 1951, 7-8 (1952)

(Abstract of this article appears under 3.249 page 9)

1.2 THE HERRING, ALEWIFE AND SHAD

Day, L. R. (Atlantic Biological Station)
Commercial Fisherman 19, No. 9, 6 (September, 1952)

The article includes a sketch of the identification, life history, distribution and commercial importance of these species.

1.2 REACTIONS OF HERRINGS, SPRATS AND PILCHARDS TO LIGHT

Richardson, I. D.
World Fishing I, No. 7, 239-244 (October, 1952)

(Abstract of this article appears under 2.14 page 17)

1.5 FREEZING AND COLD STORAGE

Anonymous
Report of the Food Investigation Board (Great Britain) for the Year 1951, 7-8 (1952)

(Abstract of this article appears under 3.249 page 9)

1.5 PREPARATION OF COD LIVER OIL BY FREEZING

Thorbjarnarson, Thordur and Jonsson, Hordur
Report on Technological Research Concerning The Icelandic Fish Industry VI, 15-26 (1944-1946)

(Abstract of this article appears under 6.23 page 3)

1.81 OYSTER CANNING IN THE MARITIMES

Anonymous
Trade News 5, No. 4, 8 (October, 1952)

(Abstract of this article appears under 3.33 page 9)

1.81 HOW TO DECIDE BEST TIME TO HARVEST OYSTER CROPS

Hopkins, Sewell H. and Menzel, R. Winston (Biology Department, A & M College of Texas, College Station, Texas)
Atlantic Fisherman 33, No. 9, 15 (October, 1952)

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Atlantic Fisherman
Australian Journal of Marine and Freshwater Research
Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemistry
Canadian Journal of Technology
Canner
Chemical and Engineering News
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Chemical Processing
Chemistry and Industry
Commercial Fisheries Review
Commercial Fisherman
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Fishermen's News
Fishing Gazette
Flour and Feed
Food Engineering
Food Manufacture
Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Technology
Foreign Commerce Weekly
Frosted Food Field
Ice and Refrigeration
Industrial and Engineering Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Home Economics
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Modern Packaging
Modern Refrigeration
Modern Sanitation
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan-American Fisherman
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Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
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Western Canner and Packer
Western Fisheries
World Fishing

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1.82 BREAKAGE -- THE BUG-BEAR IN CLAM HANDLING

Medcof, J. C. and MacPhail, J. S.
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 54, 19-24 (September, 1952)

1.85 SMOKED AND BARBECUED SHRIMP

Fieger, E. A.; Lewis, Harvye and Crown, R. M.
Southern Fisherman 12, No. 10, 31, 87 (October, 1952)

(Abstract of this article appears under 3.4 page 9)

1.85 BACTERIOLOGICAL STUDIES ON SHRIMP

Williams, O. B.
Seafood Business 5, No. 2, 16, 18, 73 (September, 1952)

(Abstract of this article appears under 2.19 page 13)

1.93 TOMATOES IN THE SUMMERTIME; TURTLE SOUP AND CHILI IN THE WINTERTIME

Anonymous
Food Packer 33, No. 11, 28-29 (November, 1952)

(Abstract of this article appears under 3.33 page 13)

2.01 BACTERIOLOGICAL STUDIES ON SHRIMP

Williams, O. B.
Seafood Business 5, No. 2, 16, 18, 73 (September, 1952)

(Abstract of this article appears under 2.19 page 13)

2.1121 WHAT HAPPENS TO A TOWED NET? (PART I) DRAGGERMEN SAY MESHES CLOSE UP

Loring, Paule
Maine Coast Fisherman 7, No. 4, 21 (November, 1952)

2.113 CORROSION OF METALS

Evans, U. R. (Department of Metallurgy, Cambridge, England)
Chemistry and Industry, No. 41, 986 (October 11, 1952)

2.114 WINCHES ON FISHING BOATS

Anonymous
Fishing Gazette 69, No. 10, 58 (October, 1952)

2.115 DESIGN AND CONSTRUCTION OF THE AMERICAN TRAWLER

Simpson, Dwight S.
World Fishing 1, No. 7, 253 (October, 1952)

2.116 UNDERWATER TELEVISION

Anonymous
Atlantic Fisherman 33, No. 10, 9 (November, 1952)

(Abstract of this article appears under 9.10 page 11)

2.116 DETECTION OF SQUID SCHOOLS BY THE FISH-DETECTOR (RECORDING ECHO SOUNDER BY SUPERSONIC)

Mishima, Seikichi
Bulletin of the Faculty of Fisheries, Hokkaido University 1, No. 2, 97 (February, 1951)
(In Japanese with English summary and figure)

2.118 THE SHIP "ARTICO", FISH FACTORY

Marino, A.
World Fisheries Abstracts 2, No. 1, 13 (1951)

2.12 DEEP SEA FISHING IN THE INDIAN OCEAN

Khanna, M. L.
Modern Refrigeration 55, No. 655, 338 (October, 1952)

(Abstract of this article appears under 1.015 page 11)

2.12 PROJECT "OFFSHORE," COASTAL TEMPERATURES, AND TUNA

Tully, John P. and Bennett, E. Bertram
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 92, 7 (October, 1952)

2.19 FREEZING AND COLD STORAGE

Anonymous
Report of the Food Investigation Board (Great Britain) For The Year 1951, 7-8 (1952)

(Abstract of this article appears under 3.249 page 9)

2.3 FISH HANDLING AND PROCESSING IN U. K. PART IV

Empey, W. A.
Fisheries Newsletter (Australia) 11, No. 9, 10-11, 19 (September, 1952)

(Abstract of this article appears under 1.0146 page 11)

3.0 FISH HANDLING AND PROCESSING IN U. K. PART IV

Empey, W. A.
Fisheries Newsletter (Australia) 11, No. 9, 10-11, 19 (September, 1952)

(Abstract of this article appears under 1.0146 page 11)

3.18 WARFARIN AND PERIMETER RODENT CONTROL

Fitzwater, William D. Jr. (U. S. Fish and Wildlife Service, Lafayette, Indiana)
Food Technology 6, No. 11, 436 (November, 1952)

3.230 SHRIMPBURGERS ARE SET FOR NATIONAL DISTRIBUTION

Anonymous
Frosted Food Field 15, No. 4, 14 (October, 1952)

A new seafood item, Shrimpburgers, is ready for national distribution after many months of successful test-marketing. The precooked shrimpburgers are a ground mixture of shrimp, eggs, seasoning and some rice.

3.231 ABSORPTION REFRIGERATION IN THE FISHING INDUSTRY

Gunnarsson, G. K.
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 54, 7-11 (September, 1952)

(Abstract of this article appears under 2.114 page 5)

3.234 STUDIES ON THE MUSCLE OF THE AQUATIC ANIMALS. XI. ON THE DENATURATION OF FISH MUSCLE PROTEIN CAUSED BY FREEZING AND SALTING, AND THE RELATION BETWEEN THEM

Simidu, Wataru and Hibiki, Sigeyuki
Bulletin of the Japanese Society of Scientific Fisheries 17, No. 10, 301 (1951)

(Abstract of this article appears under 0.32 page 21)

3.33 THE PREPARATION OF CANNED WHOLE HERRING

Huntley, J. G.
Fischw.- u. Feinkostind 23, 119-121, 195-196 (1951)

3.33 VACUUM COOLING SAVES COSTLY PROCESS TIME

Miller, Ivan C. (Assistant Editor, "Food Engineering")
Food Engineering 24, No. 10, 104 (October, 1952)

3.4 FREEZING AND COLD STORAGE

Anonymous
Report of the Food Investigation Board (Great Britain) For The Year 1951, 7-8 (1952)

(Abstract of this article appears under 3.249 page 9)

3.5 STUDIES ON THE MUSCLE OF THE AQUATIC ANIMALS. XI. ON THE DENATURATION OF FISH MUSCLE PROTEIN CAUSED BY FREEZING AND SALTING, AND THE RELATION BETWEEN THEM

Simidu, Wataru and Hibiki, Sigeyuki
Bulletin of the Japanese Society of Scientific Fisheries 17, No. 10, 301 (1951)

(Abstract of this article appears under 0.32 page 21)

3.5 ON THE INFLUENCE OF A FEW DRUGS IN SALTING FISH (FORECAST)

Masuda, S.
Bulletin of the Japanese Society of Scientific Fisheries 16, 357 (1951)

3.5 AN EXPERIMENT IN FISH SALTING

Westenberg, J.
FAO Indo-Pacific Fisheries Council, Proceedings 2nd meeting, April, 1950, Cronulla, N.S.W., Aust., Sect. II, pp. 123-125

3.5 IMPROVED MEDIUM FOR RED HALOPHILIC BACTERIA FROM SALT FISH

Dussault, H. P. and Lachance, R. A.
Journal of the Fisheries Research Board of Canada 9, No. 3, 157-163 (September, 1952)

(Abstract of this article appears under 0.5 page 11)

3.60 PRINCIPLES OF FREEZE-DRYING

Nord, Melvin (Assoc. Professor of Chemical Engineering, Wayne University, Detroit)
Food Manufacture 27, No. 11, 452 (November, 1952)

3.7 A PRELIMINARY REPORT OF THE STUDY ON THE DRYING OF MARINE PRODUCTS BY INFRA-RED RAY HEATING

Ishida, Masami, and Yamada, Minoru
Bulletin of the Faculty of Fisheries, Hokkaido University 1, No. 2, 93 (February, 1951)
(In Japanese with English summary)

3.8 STUDIES ON THE PICKLE OF FISH PRODUCTS

Nitta, T.; Umemoto, S.; Makai, T. and Nisimura, K.
Bulletin of the Japanese Society of Scientific Fisheries 16, 395 (1951)

3.9 ERRORS IN FISH SAUSAGE PRODUCTION

Reuter, H.
Dtsch. Lebensmitt.-Rdsch 46, 14-16 (1950)

Owing to the peculiarities of fish flesh, special precautions must be taken in the manipulation and production of fish sausage and similar foods.

4.21 BIOCHEMISTRY OF FISH

Anonymous
Report of the Food Investigation Board (Great Britain) For The Year 1951, 11-12 (1952)

(Abstract of this article appears under 6.130 page 17)

5.41 STUDIES ON THE FRACTIONATION OF AN UNIDENTIFIED GROWTH FACTOR REQUIRED BY CHICKS AND POULTS

Menge, H. and Combs, G. F. (University of Maryland, College Park, Maryland)
Poultry Science 31, No. 5, 927 (September, 1952)

6.190 THE EFFECT OF FEEDING ANTIBIOTICS ON THE CARBOHYDRATE AND PROTEIN REQUIREMENTS OF THE CHICK

Biely, J.; March, B. E.; and Smith, D. F. (Poultry Nutrition Laboratory, The University of British Columbia, Vancouver, B. C.)
Poultry Science 31, No. 5, 863 (September, 1952)

In order to take full advantage of the growth stimulating properties of antibiotics it is necessary to provide a diet of high energy and optimum protein content, as well as one well balanced in amino acids.

6.192 EFFECT OF VITAMIN B_{12} INTAKE OF HENS UPON CARRY-OVER IN CHICKS

Wiese, A. C.; Petersen, C. F.; Dahlstrom, R. V.; and Lampman, C. E. (Department of Agricultural Chemistry and Poultry Husbandry, University of Idaho)
Poultry Science 31, No. 5, 851 (September, 1952)

Three percent herring fish meal in an all-mash breeder ration permitted a carry-over of vitamin B_{12} sufficient to permit good chick growth to 4 weeks of age.

6.195 THE EFFECT OF HEAT ON THE BIOLOGICAL VALUE OF PROTEINS

Morgan, Agnes Fay
Journal of Home Economics 44, No. 10, 761-764 (December, 1952)

(Abstract of this article appears under 6.139 page 7)

7.66 SEPARATION OF D VITAMINS FROM OTHER STEROLS BY PAPER CHROMATOGRAPHY AND THE QUANTITATIVE DETERMINATION OF 7-DEHYDROCHOLESTEROL

Davis, Richard B.; McMahon, John M.; and Kalnitsy, George
Journal of the American Chemical Society 74, No. 18, 4483 (September 20, 1952)

7.69 DEVELOPMENT OF A CHICK ASSAY FOR AN UNKNOWN GROWTH FACTOR

Lillie, R. J.; Sizemore, J. R.; and Bird, H. R. (Agricultural Research Administration, Beltsville, Maryland)
Poultry Science 31, No. 5, 923 (September, 1952)

Assays showed fish meal, fish solubles, meat meal, brewers' yeast and dried cells of Torula utilis and Hansenula suaveolens to be effective in promoting growth.

7.872 A SIMPLE METHOD FOR THE IMPROVEMENT OF THE KEEPING QUALITY OF OILS AND FATS

Bertram, S. H. and Wynia, G. M.
Journal of the American Oil Chemists' Society 29, No. 12, 629-631 (December, 1952)

(Abstract of this article appears under 4.64 page 17)

8.51 CHEMICAL STUDIES ON THE SEAWEEDS. 2. ON THE AMINO ACIDS OF ULVA PERTUSA, ENTEROMORPHA LINZA, AND ENTEROMORPHA LINZA VAR. CRISPATA

Takagi, Mitsuzo
Bulletin of the Faculty of Fisheries, Hokkaido University 1, No. 2, 77 (February, 1951)
(In Japanese with English summary, table and figures)

8.59 ALCOHOL IN A MARINE TUBE WORM

Fagerlund, Ulf and Swain, Lyle A.
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 92, 16 (October, 1952)

The liquid isolated is considered to be one or more low-molecular-weight fatty alcohols.

8.59 BIOCHEMICAL STUDIES ON SKIPJACK KATSUWONUS VAGANS -- I. CHEMICAL COMPONENTS OF PYLORIC CAECA AND EXTRACTIVE MATTER

Kashiwada, Kenichi; Katimoto, Daiichi; and Horiguchi, Yoshishige
Bulletin of the Japanese Society of Scientific Fisheries 18, No. 4, 147 (1952)
(In Japanese with English summary and tables)

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